A HITCHCOCK PUBLICATION

GRINDING and FINISHING

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INDUSTRY LEADERS EXPLAIN:

How to profit from major 1960 developments

How to Finish Flame-Plated Coatings

A Cutter Grinding Problem Solved at Caterpillar

JANUARY • 1961 • 50 CENTS

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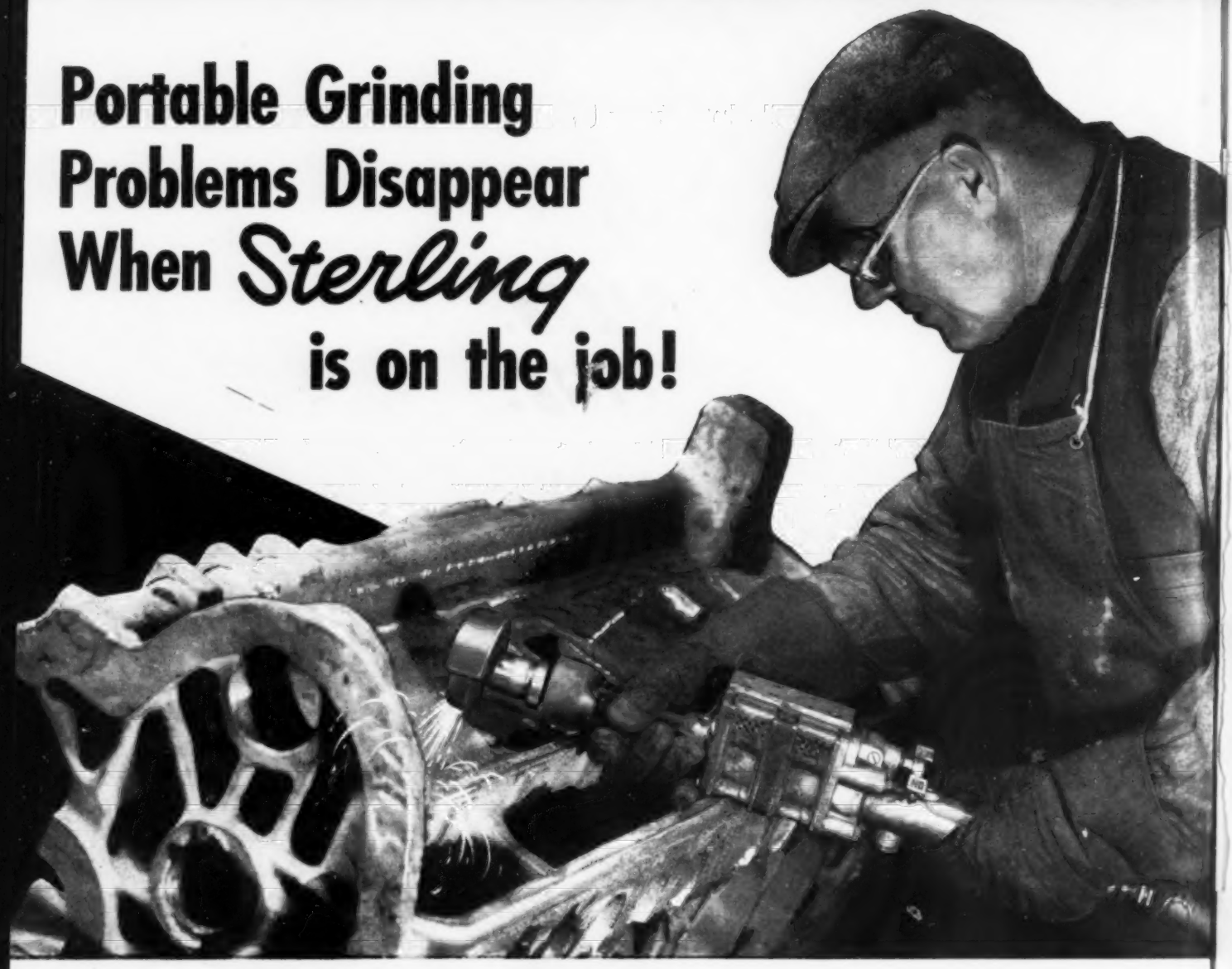

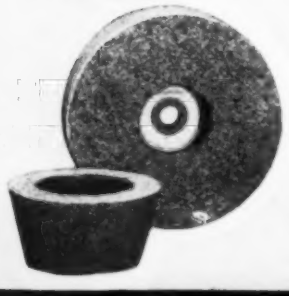

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"THE WHEELS OF INDUSTRY" STERLING

FOR BETTER PRODUCTION AND FINISHING WITH ABRASIVES

GRINDING and FINISHING

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BPA

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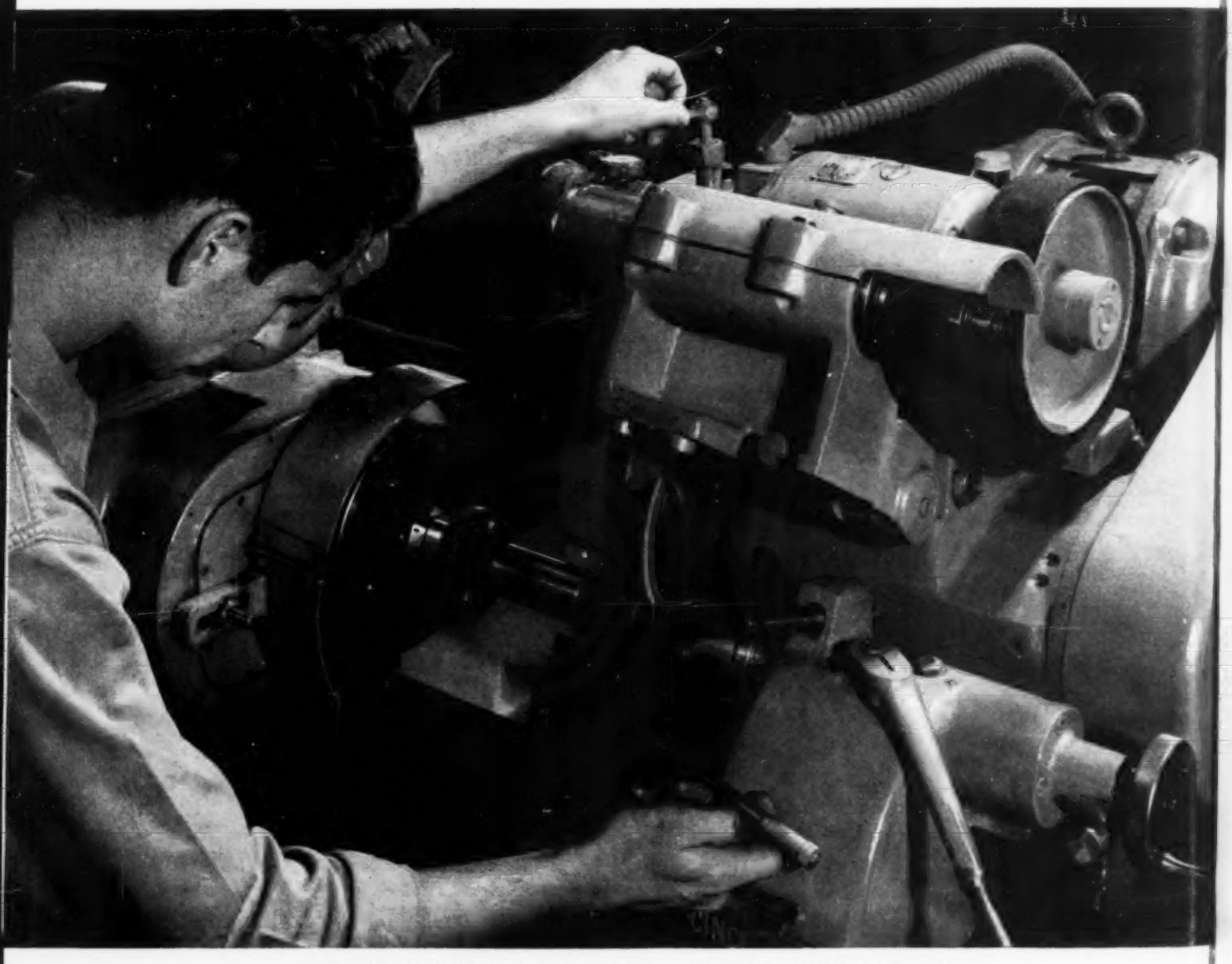

For external cylindrical grinding, internal head is instantly swiveled up and out of the way. The machine is a CINCINNATI 12" Hydraulic Universal Grinding Machine.

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Make setup time the prime target for reducing toolroom grinding costs. CINCINNATI Universals can help you minimize this high-percentage element of cost in several ways:

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- **Power rapid positioning* of the wheelhead, to facilitate setup of widely varying diameters.
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CINCINNATI Universals (built in 10", 12", 14" and 18" swing sizes) are by far the most versatile and dependable of any comparable machine available. Get more information by writing for catalogs.

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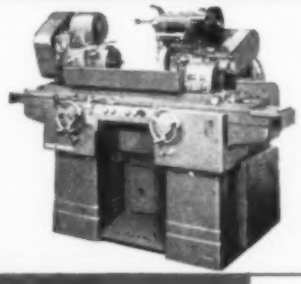

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Hydraulic Universal
Grinding Machine.
Catalog No. G-737.

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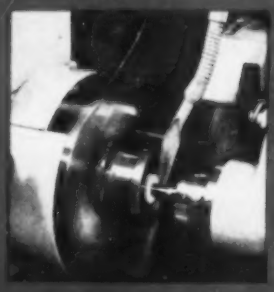
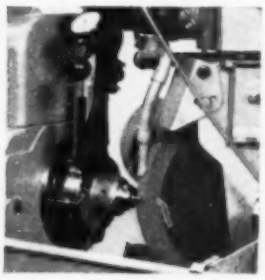
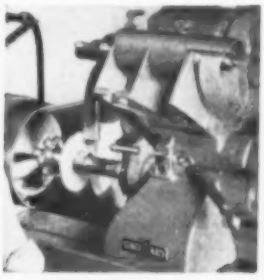


internal grinding

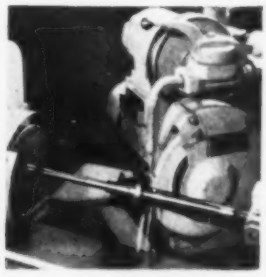


production grinding with Acrasize gaging

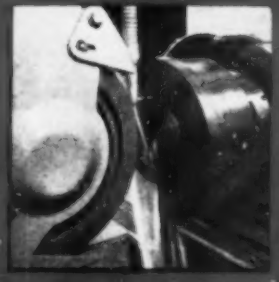
internal grinding



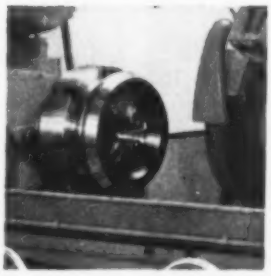
infeed grinding a hub



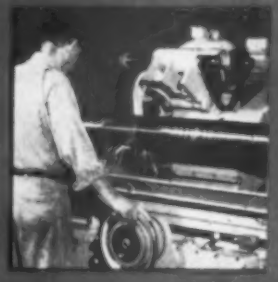
grinding a shoulder, wheel and drive interchanged



face grinding



grinding a bevel



traverse grinding large part

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Editor's Mail

PROPER TOOL GRINDING EMPHASIZED

By neglecting the proper grinding of cutting tools the metalworking industry is literally wasting hundreds of machining man-hours, in spite of terrific advances in automation.

In essence, that is what Robert M. Miller, assistant to the vice president in charge of sales for DeVlieg Machine Co., Royal Oak, Mich., told a recent meeting of the North Texas chapter of The American Society of Tool & Manufacturing Engineers.

The basic function of any machine designed for metal removal, he reminded the engineers, is to make a chip. The machine does not make a part, but rather makes a chip and leaves a part. Thus, for efficiency, the machine depends on the chip-making member, the cutting tool—and the efficiency of the cutting tool on proper grinding.

But, he added, the importance of grinding cutting tools properly apparently is still not very well understood by industry today. Cutting tool grinding is still too often relegated to the attic, so to speak, and its prime role in contributing to machine tool efficiency is completely disregarded.

With the development of automated machines some years ago, and with the advent of numerically-controlled machine tools, Miller pointed out, it is becoming absolutely essential that more attention be paid to cutting tools and their preparation—to keep machine tool spindles in action longer.

In revealing, during the meeting, one of the latest grinding techniques for controlling the vital geometric elements in preparing single-point cutting tools used in machining today's modern metals, he added:

"The complexity of today's automated and numerically-controlled machines is such that their cost can, and very often does, run into six figures. To justify such expenditures, spindles must be kept running a greater percentage of the available time."

MECHANICAL HONING MACHINE

We certainly appreciate your very fine article in the November issue of GRINDING and FINISHING on the honing machine introduced by Natco.

However, in the caption under the picture of the entire machine, you mentioned, "Mechanical honing machine is reported to hold within .003" for total size, taper and roundness, while creating any desired surface finish."

This is pretty rough for our honing machine, and I believe our original release mentioned that we can hold within .0003".

L. T. Matthys
Advertising Manager
National Automatic Tool
Company, Inc.

The correct figure is, of course, .0003", as readers familiar with honing have undoubtedly surmised.

CAUTION

JANUARY IS OUR VERIFICATION MONTH

Please be sure to check your January issue wrapper!

A *Fast Cut* To SAVE MONEY!

NEW MANHATTAN *Fast Cut* MOLDISC

DEPRESSED CENTER TYPE 27

- will remove more metal—
- grind more welds—
- get *more* work done *faster* than any other wheel of its type

Price each SPECIFICATION A24-Q8-BR	SIZE	25	50	100	250
	7 x ¼ x ⅞"	$3.46	$3.14	$2.77	$2.59
	9 x ¼ x ⅞"	4.67	4.24	3.73	3.49

Try The New MANHATTAN *FAST CUT* MOLDISC—

and *SAVE MONEY* on Your Next Job!

RM-1062

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WRITE TO ABRASIVE WHEEL DEPARTMENT

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RAYBESTOS-MANHATTAN, INC.

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NEW *from* NORTON

Segments of new 23 ALUNDUM abrasive . . .*

premium performance at non-premium price

Surface grinding gets a real performance-lift from Norton — combined with a definite economy!

Newest development for segments for vertical spindle surface grinders is 23 ALUNDUM abrasive.

This is no ordinary aluminum oxide. Here you get premium toughness and sharpness — plus the friable nature that eliminates dressing.

Two other big advantages are versatility and uniformity. 23 ALUNDUM abrasive is ideal for surface grinding carbon steels, mild steels, stainless steels, Meehanite and aluminum. And to this broad range 23 ALUNDUM segments bring maximum uniformity of performance — the results of a two-year Norton project to develop the closest possible duplication of structure and dimensions.

Users already know these benefits

Segments of 23 ALUNDUM abrasive have had thorough test runs from coast to coast. The following reports from Norton surface grinding customers are typical:

- *"With the new segments we get freer cutting and higher production rate."*
- *"Very good on all our metals. Required no dressing."*
- *"No burn, even with full power. Better finish, longer life on all metals. We're standardizing on '23'."*
- *"Best segments we've ever used for general purposes, including chrome plate."*
- *"Much less dressing, faster cut, less heat."*

Find out how 23 ALUNDUM segments can benefit your own production. See your Norton Distributor about a test run in your plant. Or your Norton Man will give you plenty of facts about this big, new advancement in surface grinding. NORTON COMPANY, General offices, Worcester 6, Massachusetts. Plants and distributors around the world.

W-2001

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ABRASIVES

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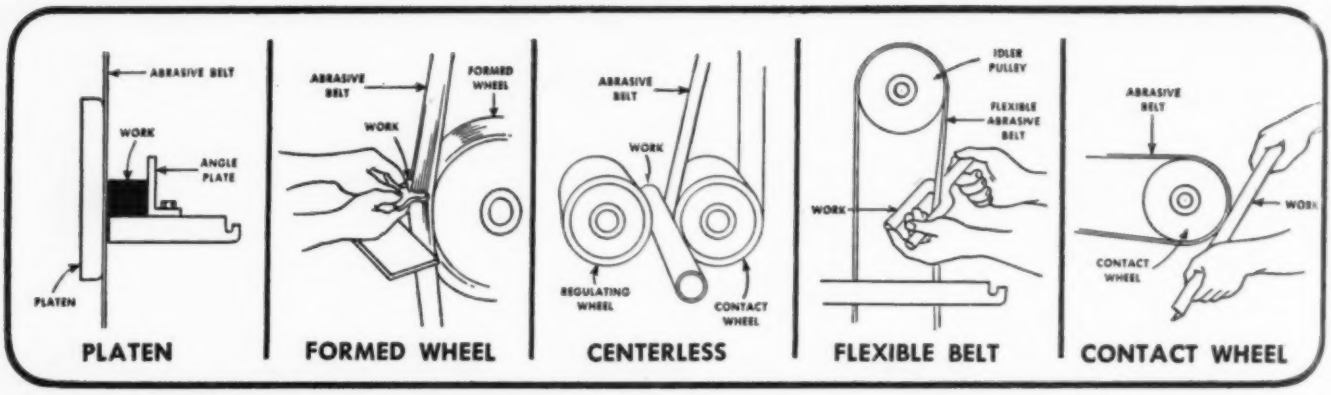
BELT GRINDING: opportunity unlimited for faster finishing and metal removal

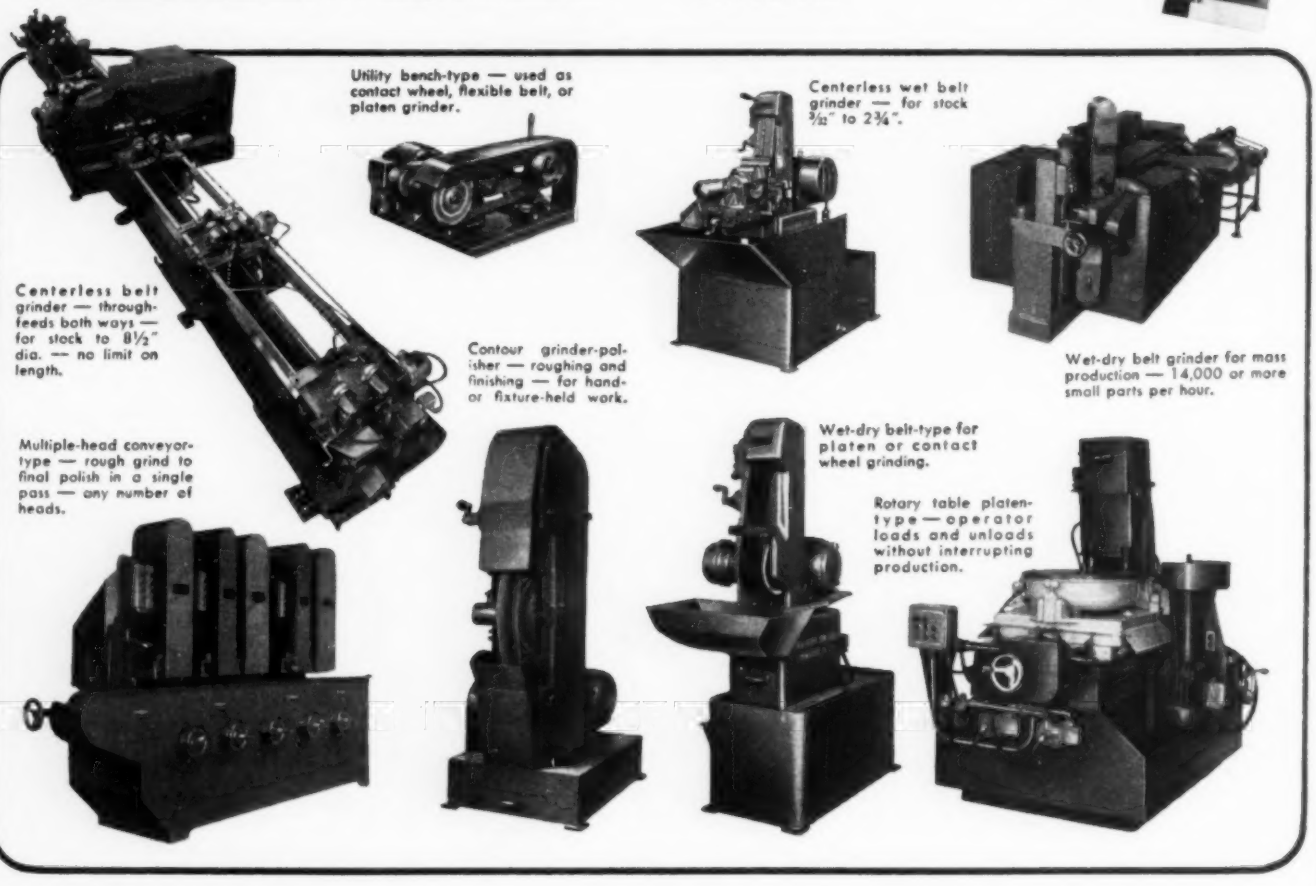


The opportunities for application of Sundstrand Engelberg precision abrasive belt grinders to improve quantity and quality of work are a stimulus to the imagination of creative methods men.

The belt grinding principle provides exceptionally rapid stock removal — up to three pounds of non-ferrous metal per minute! It speeds production and reduces costs because on most jobs it's from two to eight times faster. Setups are simple . . . tool dressing or grinding is eliminated . . . change-over takes but a few minutes . . . fixturing is simpler . . . and surface finish normally is markedly improved.

Wet and dry belt types are available for every requirement from toolroom work to automatic production of as high as 15,000 parts or more per hour.

A few of the many models of Sundstrand-Engelberg grinders are illustrated below. For more complete information, ask for descriptive literature.


Utility bench-type — used as contact wheel, flexible belt, or platen grinder.
Centerless wet belt grinder — for stock 3/32" to 2¾".
Centerless belt grinder — through-feeds both ways — for stock to 8½" dia. — no limit on length.
Contour grinder-polisher — roughing and finishing — for hand- or fixture-held work.
Wet-dry belt grinder for mass production — 14,000 or more small parts per hour.
Multiple-head conveyor-type — rough grind to final polish in a single pass — any number of heads.
Wet-dry belt-type for platen or contact wheel grinding.
Rotary table platen-type — operator loads and unloads without interrupting production.

SUNDSTRAND ENGELBERG

SUNDSTRAND-AMERICAN BROACH

ANN ARBOR, MICHIGAN • DIVISION OF SUNDSTRAND CORPORATION

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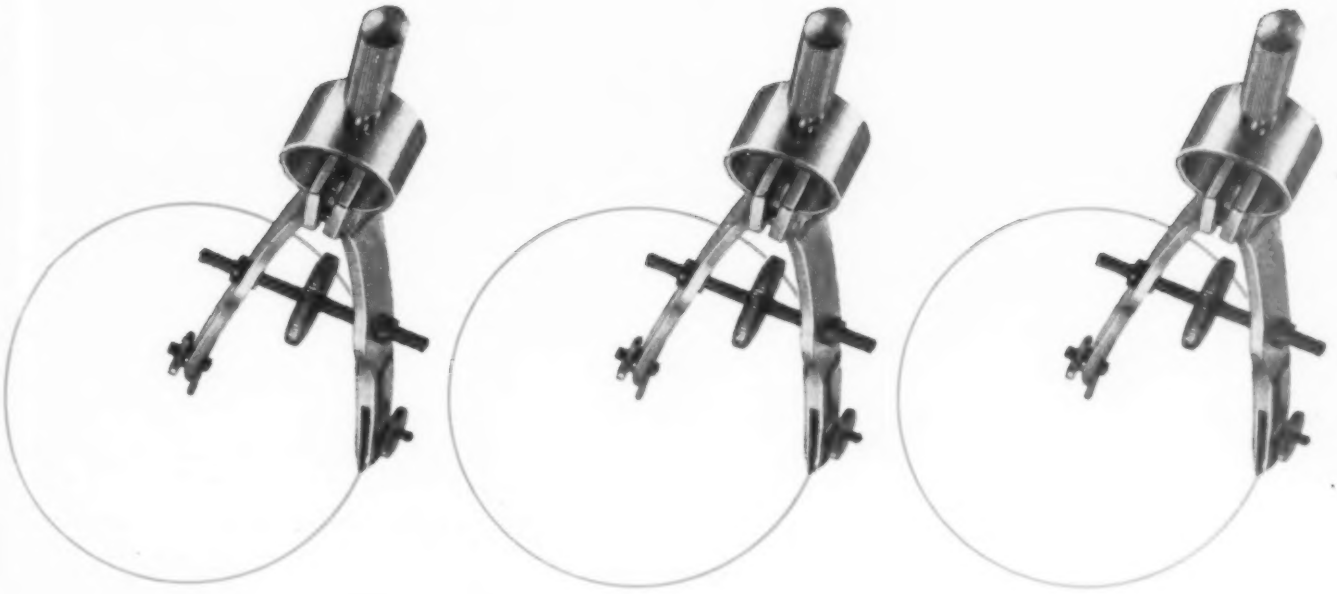

POSITIVE DUPLICATION–EVERY TIME!

As surely as a drawing compass can produce identical circles, you can be sure of getting Positive Duplication with these floor stand grinding wheels, and with *all* CINCINNATI (PD) ° SNAGGING WHEELS.

This predictable uniformity is the result of Cincinnati's unique 36-step (PD) manufacturing process. These rigid controls achieve tolerances for wheel inside diameters which are the "tightest" in the industry. Your (PD) WHEELS have better balance and last longer.

"PD" PAYS OFF FOR YOU

Your cleaning room costs will go down, when you start using CINCINNATI (PD) WHEELS. Our grinding specialists are at your service, to work with you in finding the best grading for your stand, swing frame and portable grinders. Once you have the (PD) WHEELS that give you the lowest labor and wheel cost, you can keep those costs down, because each reorder wheel will act and grind exactly like the original wheel . . . thanks to Positive Duplication.

CUT COSTS . . . CALL CINCINNATI

For experienced help on cutting costs, call your CINCINNATI (PD) GRINDING WHEELS Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI°
GRINDING WHEELS

°Trade Mark Reg. U.S. Pat Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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How Bob Clark increased

After getting his B.A. at Illinois College, Bay State Abrasive Specialist Robert M. Clark joined U.S. Steel where his work gave him a great deal of highly practical experience in metal-working problems. Since coming to Bay State in 1956, he has been in contact with just about every type of metal-working operation in the Chicago area and he's proven his skill by diagnosing and curing some unusual grinding shop ailments.

Getting a 20% increase in wheel life is a solid bonanza in any grinding operation, but there's more to this Bay State case history than that. It's an excellent example of the way careful analysis of the *whole* abrasive problem can pay *multiple* dividends.

It started with a simple test. Two unmarked Bay State diamond wheels were delivered to Cummins Engine Company, Inc., Columbus, Indiana, for a performance check against two competitors' wheels under standard shop conditions. Fifty-five days later the competition's wheels were completely used up. The Bay State wheels lasted 66 days.

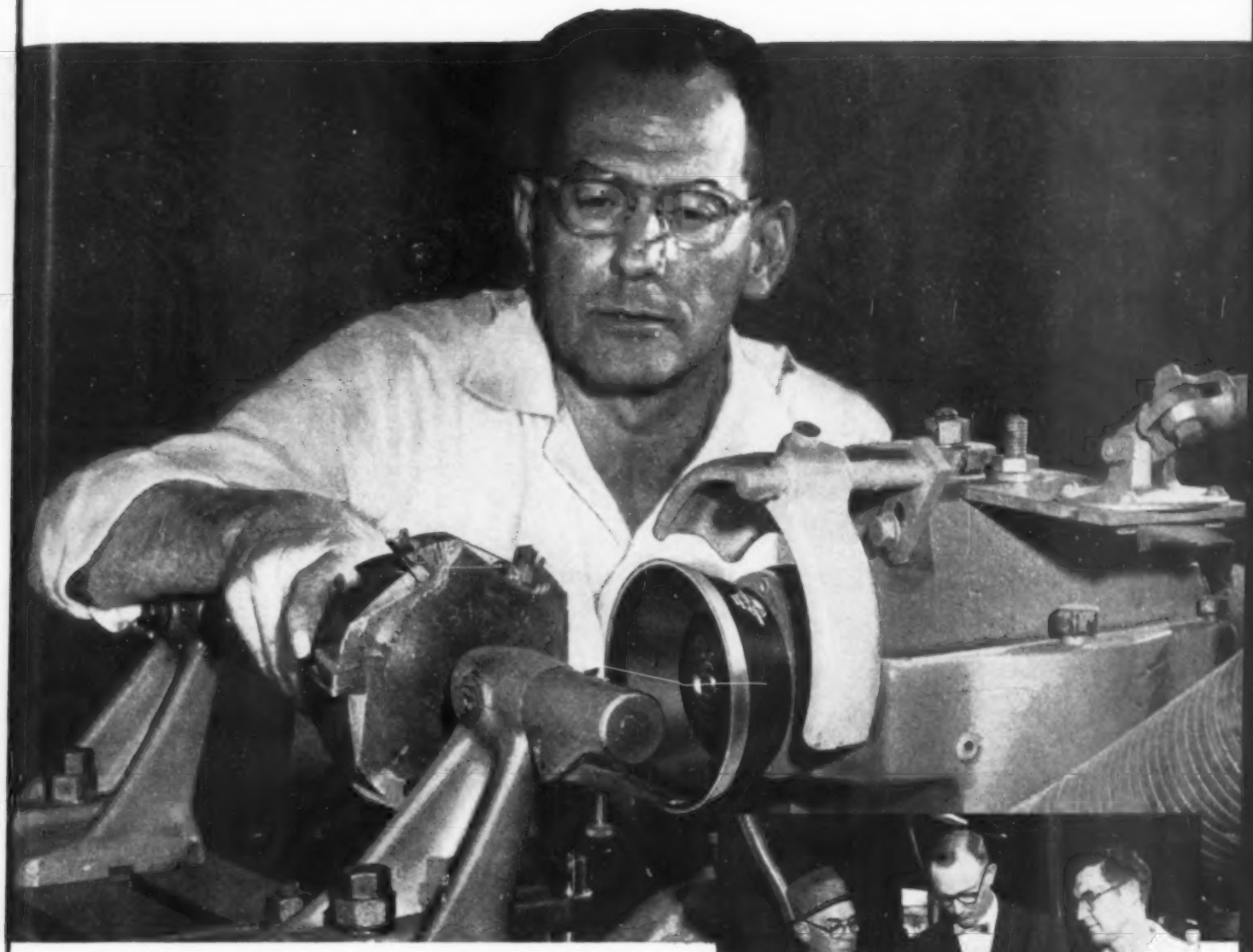
Since both types of wheels had been doing identically the same kind of work . . . and both carried exactly the same price tag . . . the 20% longer life of the Bay State wheels represented a solid cash saving.

On top of this, however, Bay State Abrasive Specialist Bob Clark found that wheels of 1/16" diamond depth could be used on certain jobs instead of the 1/8" depth wheels used in the test with an additional saving of $13,000 a year. And, finally, he worked out a new quantity-ordering system for Cummins that saved a further $1,824.00 annually and also insured against emergency shortages of wheels.

Bob Clark's outstanding thoroughness and demonstrated ability in this case have led to his being asked to survey all of Cummins diamond wheel applications and work out optimum wheel specifications for each job.

Diamond grinding is a highly specialized technique, of course, but even if your grinding operations call only for well-known standard specifications, there's an excellent chance that Bay State can give you improved performance. Why not call in your Bay State distributor or direct factory representative and put him to work? *Better grinding at lower cost . . . that is his business.*

diamond wheel life from 55 to 66 days at Cummins Engine Company, Inc.



▲ Operator Charles Adams prepares to make the first pass on a milling cutter with Bay State diamond cup wheel of 1/8" diamond depth. This is the actual specification that out-performed competing wheels by 20%.

Discussing the advantages of 1/16" diamond thickness wheel for specialized operations are (left to right): John Hedges, Supervisor of Tool Control at Cummins, Bay State Abrasive Specialist Bob Clark and Cummins Abrasive Investigator Robert Elliot. ▶

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

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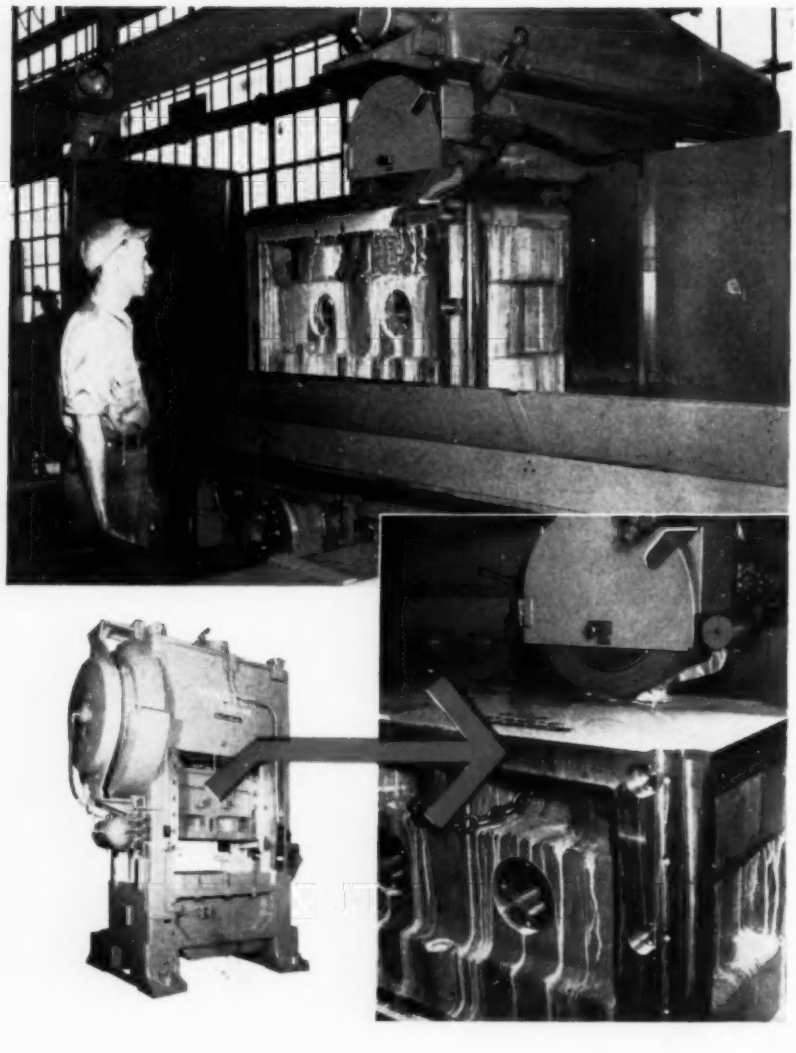
SIZE FOR SIZE

there are no heavier or more accurate surface grinders made than these fast, heavy duty Thompsons



Thompson Type CX heavy-duty surface grinders are designed to grind heavy, massive work pieces. Their stock removal rate is very fast while maintaining extremely close limits of accuracy and microfinish.

Shown here is a Thompson Type CX 30x36x96 machine recently installed in the Minster Machine Company plant at Minster, Ohio. It is grinding the face of the slide for a 200-ton capacity Minster Piece-Maker High Speed Automatic Production press.

The slide is cast iron and weighs approximately 7000 pounds. It is being ground for precise parallelism and to a 20 to 30 RMS finish.

Thompson Grinders have an important part in the production of these world-famous Minster presses. The dependability of Thompson Service and the excellent performance of the Thompson machines now in use at Minster were major factors in the purchase of this latest grinder.

If your production involves the grinding of large, heavy work, it will pay you well to investigate the money and timesaving features of these modern machines.

THE THOMPSON GRINDER CO. Springfield, Ohio

Thompson SURFACE GRINDERS

"Keep Thompson in mind for that daily grind"

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

Diamond wheel wear . . . Coated roll grinding . . . Grinding stellite . . . Deburring

ROLL GRINDING WITH COATED ABRASIVES

What is your opinion of coated abrasives for grinding rolls for paper machinery?—O. H. B., Oslo, Norway.

An old grinding wheel man like me might be somewhat prejudiced on this subject.

Although great strides have been made in the use of abrasive belts, both wet and dry, for centerless grinding and various other applications, I am of the opinion that the abrasive wheel is still the most economical tool for the reconditioning of metal rolls.

The ease of dressing a wheel, and the assurance of obtaining almost any desired finish by proper selection of wheel specification and method of dressing makes for more universal application.

The finish produced by coated abrasives is constantly changing, as I see it, from the time the belt is mounted until it is discarded.

There is, of course, a case for coated abrasives in this application, but I am hardly the man to plead it. If any readers would like to present it, however, I'd be glad to give them equal or even greater space.

REDUCING DIAMOND WEAR

What can I do to cut down on diamond wheel wear on carbides?—P. A., Somerville, Massachusetts.

It seems a bit doubtful that you are interested in reducing diamond wheel wear as such. Usually a plant is concerned with diamond wheel cost in relation to over-all cost, which includes labor and overhead.

In other words, if you reduced diamond wheel cost at the expense of rate of production, there would be no savings.

In reviewing your present situation, I'd suggest you consider these factors:

If you are now dry grinding, the use of a solid coolant or spray application would reduce the heat of grinding and prolong wheel life.

Possibly you are now using comparatively fine-grit wheels. The coarsest possible grit size will cut cooler and hence prolong wheel life.

You might want to investigate the possibility of using harder grades than those now in use.

Limiting the downfeed to a maximum of .0005" will reduce the tendency to dislodge the diamond grit while cutting.

Frequent dressing of the wheel face with pumice will maintain free cutting and reduce destructive heat.

Closely associated with cost reduction in grinding is a more rigid control over carbide tools in production. If tools are permitted to be used after excessive dulling of the cutting edge, abnormal breakdown and resulting higher grinding costs will occur.

Periodic replacement of carbide tools in service will result in greater over-all tool life and lowered diamond wheel costs.

"Ultrasonic machining . . . at a frequency too high to be heard by the human ear."

DEBURRING SMALL PARTS

Can you comment briefly on the various methods of deburring small parts.—J. J. K., Norwood, Mass.

Methods of deburring for small parts vary considerably from one plant to another.

Excessive labor costs of handling single parts over a rubber bonded wheel or an MX type (compressed abrasive-impregnated cloth) wheel have shifted much of this work to some type of tumbling.

The development of vibratory finishing and improvements in media and compounds have made tumbling a much more precise operation.

With the tremendous savings resulting from the capacity and the low labor cost of some form of barrel or vibratory finishing, it is difficult to justify in mass production any method involving handling.

SURFACE GRINDING STELLITE

Please give me a general recommendation for grinding stellite on a small surface grinder—F. E. S., Wakefield, Massachusetts.

For surface grinding stellite on a small surface grinder, I would suggest the following:

A premium type aluminum oxide abrasive, 60 grit, grade G, induced pore type, vitrified bond. This general suggestion can be refined for your specific situation with one or more of your regular suppliers.

Because very hard materials are resistant to abrasion, fine grit wheels with more limited depth of cut appear to be more satisfactory than coarser grit sizes. The open pore construction reduces the area of grind in contact with the work at any one time, carries the coolant across the cut, and produces a cool cutting action. • • •

Action's patented Pressure Cast Bond is a development of many years experience and know-how in metal bonding. The result is an electrolytic wheel so completely homogeneous that it becomes the most ideal and efficient component to use in electrolytic stock removal.

Action's Pressure Cast Bond offers these advantages:

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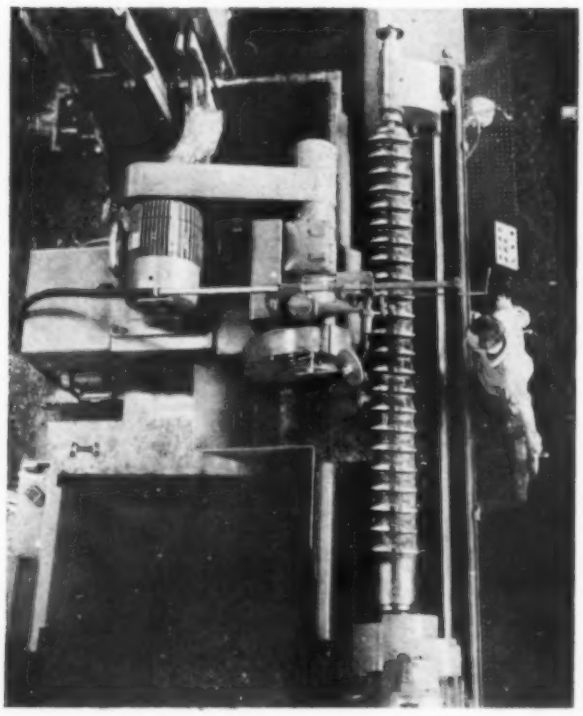
Design for Grinding

RICHARD L. McKEE • Managing Editor

Higher Quality, Half the Cost of Lathe Work

Large machine shop finds grinding superior to turning in time, quality, and cost. Case study provides data for locating break point between the two processes.



This view from the top shows the workpiece possibilities of the 24" Cincinnati roll grinder.

● What is your attitude concerning the relative merits of grinding and milling or turning with single-point tools?

Do you grind only the work that you can't cut with single point tools?

Or do you mill only the work you can't grind?

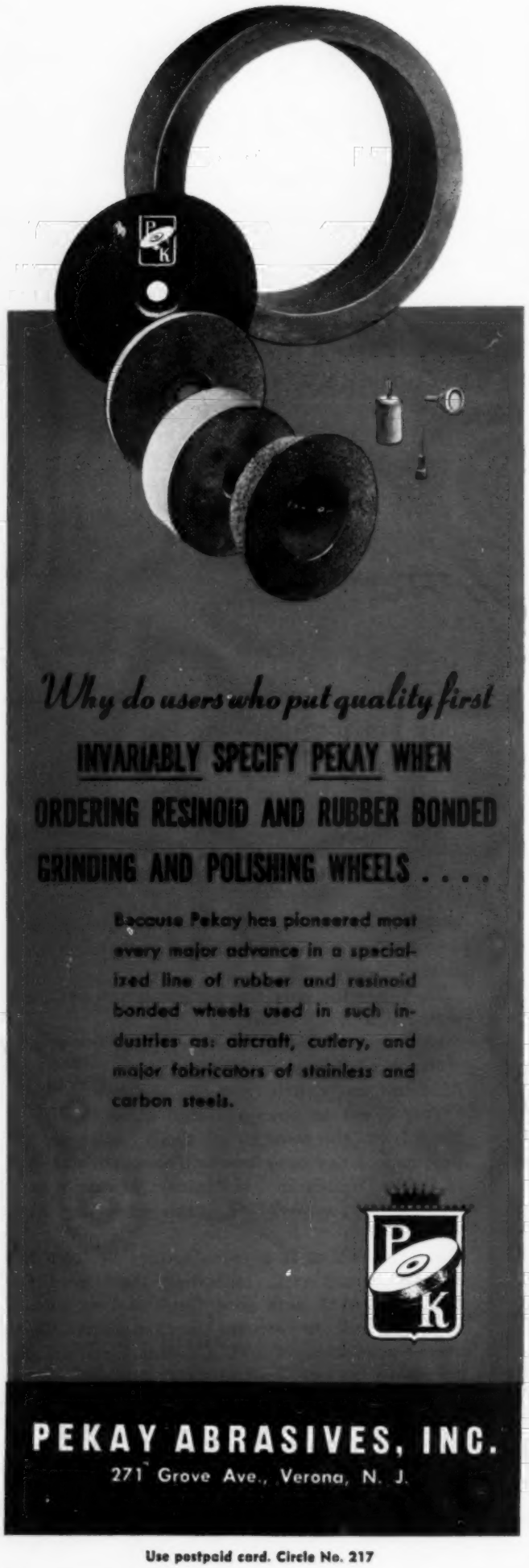
Or, at what point in terms of stock removal or finish do you switch from one to the other?

This is not an open-and-shut question. Nor is the answer the same in all shops. However, the practices of one large machine shop, such as that of Baker Perkins, Inc., of Saginaw, Michigan, may be helpful in establishing bench marks for other operations.

Baker Perkins is a manufacturer of food and chemical machinery, indicating their need for producing work with good finish and no surface imperfections, to prevent contamination. Their recent acquisition of a 24" Cincinnati roll grinder to relieve the over-load in their lathe department provides the opportunity for a review of their grinding-turning practices.

In their experience, grinding produces higher quality work for about half the cost of lathe operation. The grinding wheel, they find, is far superior to single-point tooling in achieving close

continued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tolerances. There are no worries about runout, heat transfer to the work, cracking of tools, and tool resharpening.

Within a 1/16" range they find that wheels will definitely remove material more efficiently than single-point tools. Grinding can provide finishes down to 4 micro-inches as against 32 micros, the best they have achieved with single-point tools.

Practice at BP is to grind anything requiring a finish better than 63 micros, if the work can be handled on a grinder. The grinder does the work at least twice as fast and eliminates much of the set-up time required on a lathe. On work requiring up to 1/16" stock removal, their savings run from 1/2 to 2/3rds over single-point tooling, depending on the finish and tolerances required on the job.

The shop prefers grinding on parts that have bearing surfaces, because the surfaces fit better, speeding the assembly of the machinery.

An instance of this approach is the purchase of the Cincinnati 24" roll grinder shown above in an unusual bird's-eye view and (over) in a closeup from the tailstock end of the machine.

This machine is expected to save as much as two days' production time on some machining work, taking over many difficult jobs previously overloading the company's lathe department. The part shown, a mixer screw for a special continuous mixer, 9' 4" long and 16" in diameter, illustrates its use. Previously, because no grinder large enough was available to handle a job of this

Machining this stainless blade, as shown, requires about 10 hours. Grinding takes less than three.

GRINDING VS. MACHINING

If a suitable grinding machine is available, the Baker-Perkins machine shop prefers grinding to machining if any of the following apply:

Stock removal is 1/16″ or less.
Finish required is 63 micros or better.
The work surface is a bearing surface.

size, the work was handled on several lathes with carbide cutting tools.

Machining time ran between 35 and 45 hours. With the new grinder, the comparable phase of the operation is done in 10 to 15 hours. Each of the flights shown here is about 2½″ wide at its widest point, tapering down on both sides.

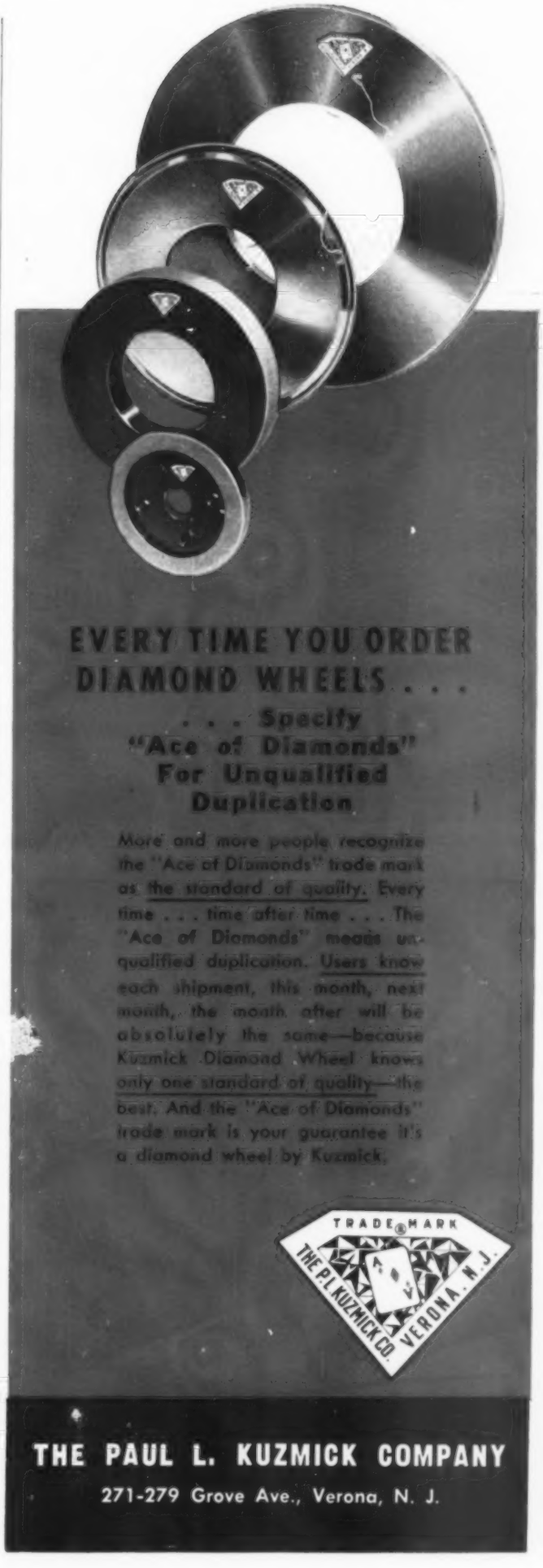
The metal is 1035 steel, with hardsurfacing metal (Rexweld A) applied by welding, ⅛″ deep.

The grinder will handle work in a range of diameters from 1 to 24 inches, lengths up to 10 feet. It has a table traverse speed of 3 to 120 inches per minute, a 25⅜″ table swing, and provides 120 inches between centers. During grinding, the work rotates in the same direction as the grinding wheel, with spindle speeds up to 6500 sfpm.

Another example of work to be shifted to the new grinder is the stainless steel Sigma blade shown (left) being machined with carbide tools on a 42″ engine lathe. This blade is used for mixing solid fuels for rockets and for similar chemical mixing applications. To prevent contamination, there must be no surface imperfections.

Machining the job as shown takes about 10 hours. Production engineers at BP estimate that it will be ground in about one-fifth the time. • • •

Closeup from the tailstock end of the grinder shows the roughness of the work.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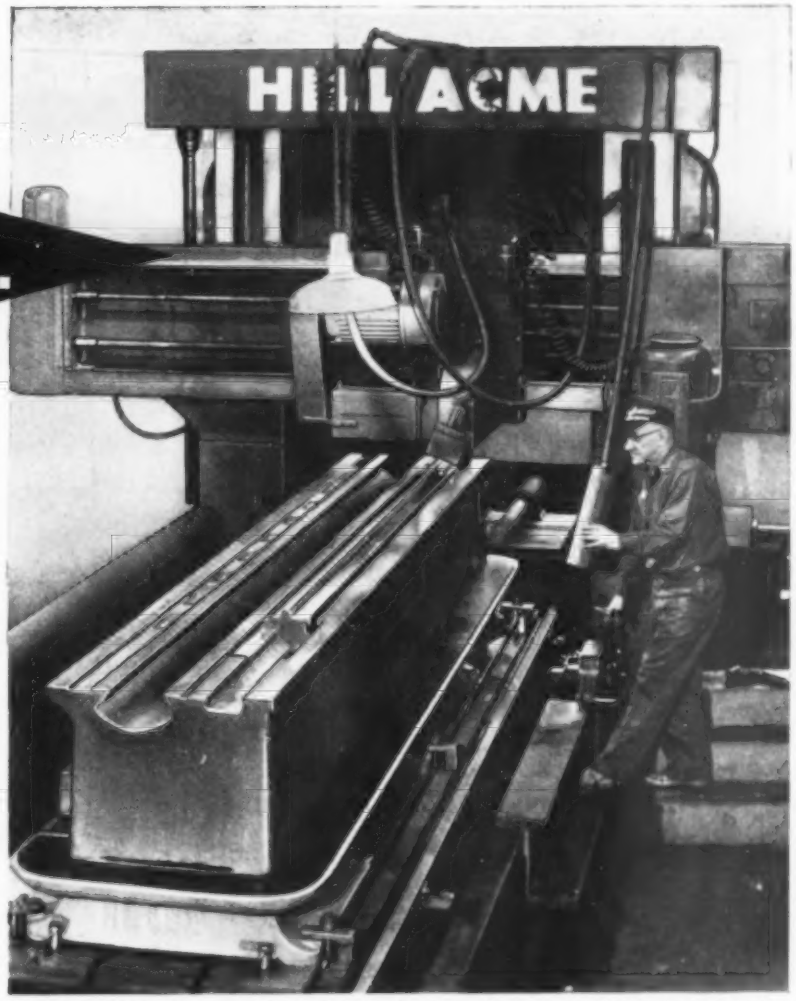
Are You Caught...

BETWEEN RISING LABOR COSTS AND CUSTOMER RESISTANCE TO INCREASED PRICES?

A prominent machine tool builder* now saves $1,138.10 in man hours on each spline hobbing machine by using a HILL ACME Surface Grinder to produce flat, parallel ways as compared with their old method of planing and hand scraping: –



Grinding "V" bed ways with a HILL Double Housing Hydraulic Surface Grinder.

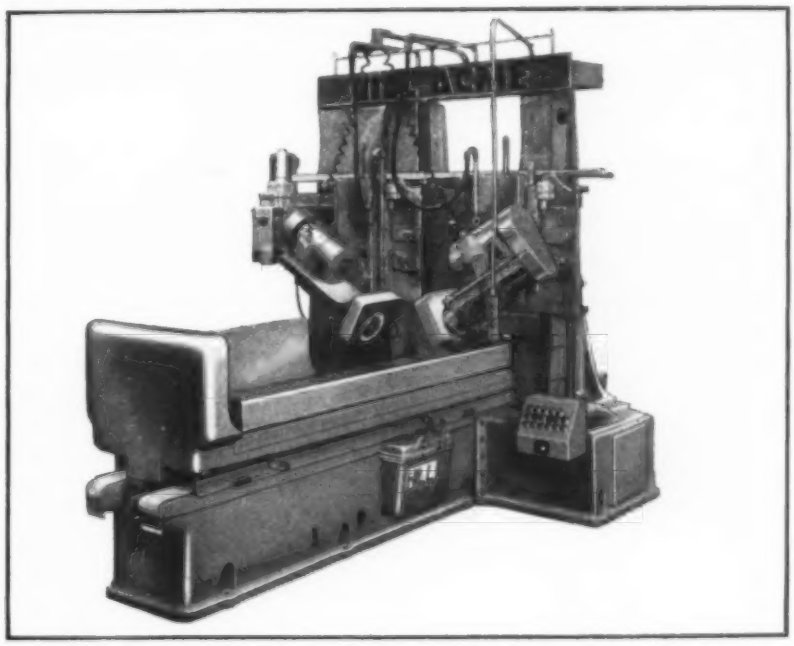
Here is the case history:

ITEM	METHOD	HOURS	RATE	TOTAL LABOR COST	
Bed 8'x72"	Scrape	96.0	2.35	$1,014.72	
	Grind	22.5	2.79	282.37	
				$ 732.35	Savings
Slide	Scrape	12.0	2.35	$ 126.84	
	Grind	.8	2.79	10.04	
				$ 116.80	Savings
Carriage	Scrape	25.0	2.35	$ 264.25	
	Grind	6.0	2.79	75.30	
				$ 188.95	Savings
Total man-hour Savings				$1,138.10	

The manufacturer reports these additional advantages:

1. A consistency of way accuracy assured.
2. Permits the use of integral hardened ways.
3. Gives a uniform oil film between way surfaces.
4. Improves delivery schedules.
5. A very favorable customer acceptance.

HILL ACME Heavy Duty Hydraulic Surface Grinders are adaptable to a wide variety of stock sizes having flat surfaces. Table widths are 24" to 60". Table lengths vary from 7 to 30 feet. Built in both horizontal spindle and vertical spindle design.



*Builders Name on request

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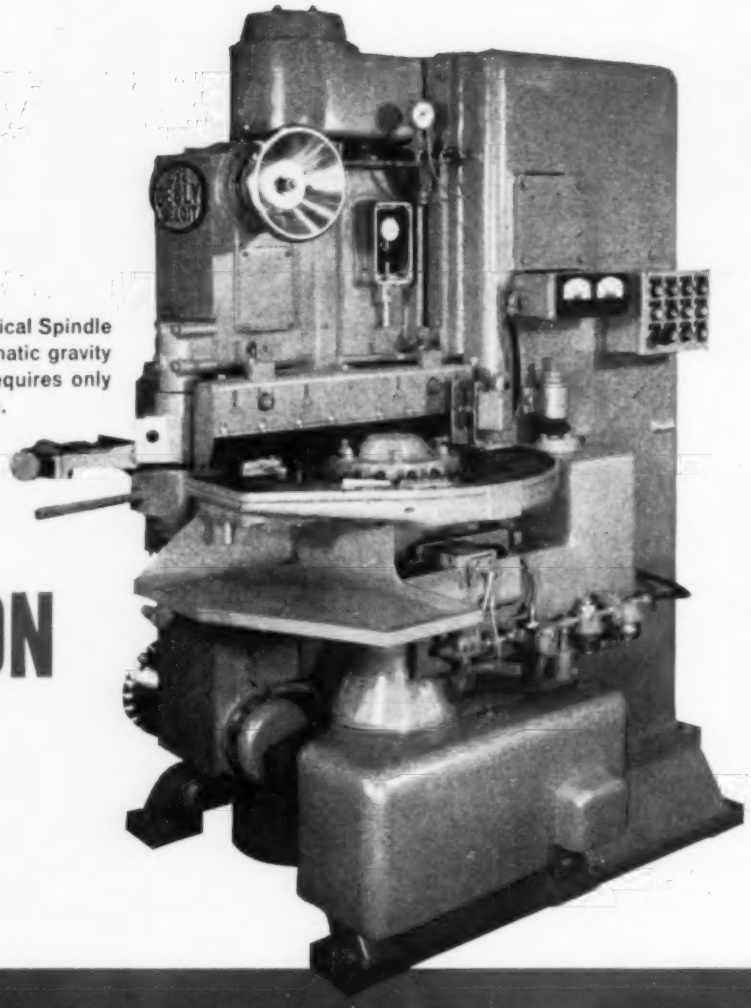

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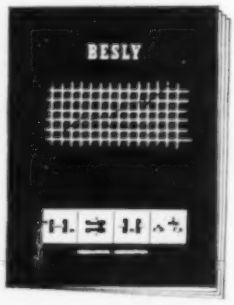
The Besly DV2, illustrated is representative of the new line of double-vertical spindle disc grinding machines now being manufactured in our South Beloit plant. Designed for production use, this unit is shown grinding top and bottom of $\frac{3}{8}$" thick throw-away carbide inserts at a rate of 3,000 passes an hour. Three passes are required to remove .016" of stock. *Tolerances on the final pass are held within .0003" for flatness, parallelism and size, with a 4 micro-inch finish.*

The DV2 will grind parts that range from .050" to $2\frac{1}{2}$" in thickness and .375" to 3" in diameter. In addition to grinding carbides or hard ceramics that require diamond abrasives, the DV2 also grinds stampings, plastic parts, alnico magnets, bearing races, coil springs, carbon parts and the like with resinoid-bond abrasive discs.



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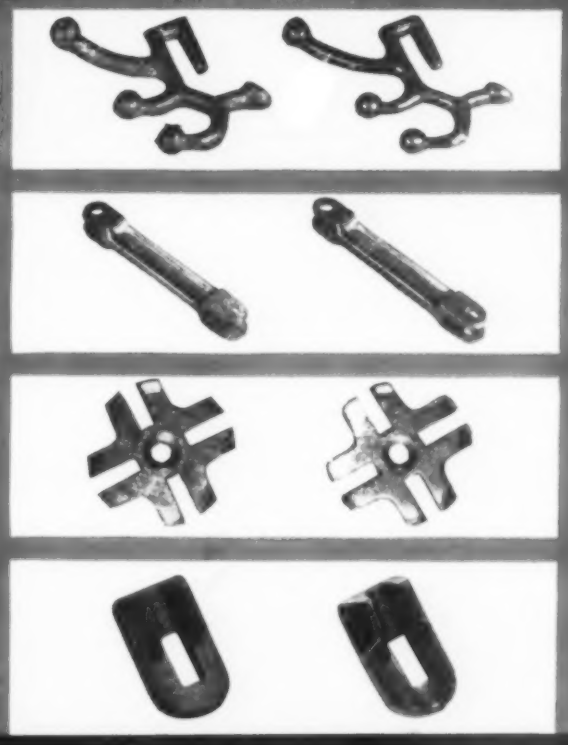

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It's Your Industry

For years now we have heard people complain about big business working for the dollar only. We have heard how collusion among big business has raised the prices just so they can make money on their products. In view of a few facts this kind of thinking just doesn't hold water for your industry.

You should be proud of the industry which is serving you. Very few if any industries provide as much customer service as the grinding and finishing industry. Few, if any, spend as much on research and development. As a matter of fact, it is getting to be a pain to hear people complain about an industry which is losing money in order to be of greater service to its customers.

In the November issue there was a story on the Wallingford Steel wide-belt grinding of stainless steel which was developed by Behr-Manning. The release of this story by these two companies proves our point from two angles. One, Wallingford's release of a process which gave them a competitive advantage even though they had just gotten it into operation showed a real patriotic spirit of sharing progress. The other angle was Behr-Manning's terrific expense in developing a process which actually reduced their sales of belts to Wallingford from 4½ to one. Sure they hope to make this up in sales to other stainless producers, but they did not realize any expense from the sale of the process and will still be competing for the business when the process is installed in other mills. In short, they have spent the money for development on the chance they will receive their share of of the resultant increased belt business.

These are not the only two companies that have displayed this quality. There are many others who should share in the credit. Take a close look at the sales of machines, bonded abrasives and coated abrasives. None have reflected the technical developments which have been made in the past five years. Sales for coated abrasives have just stayed even during this period while bonded sales have actually dropped. During this same time the number of abrasive operations have increased. If this industry was not providing a better product which produced more for less, sales would have been up proportionately.

Another industry which has been in the news recently also has done a great deal for their customers, but they charged for it. This is, of course, the drug industry. Almost everyone of us feels that the high prices which include cost of research are well worth the added benefits derived. Prices in our industry do not come anywhere near those of the drug industry for providing for research and development.

You should be proud of this industry which serves you. Everything you can do to help it does benefit you.

W. W. Patterson

Editor

INDUSTRY LEADERS EXPLAIN:

How to profit from major

Industry leaders in the grinding and finishing field were asked by the editors to answer three questions which are of most interest to the men of industry.

THE QUESTIONS

1 In what areas can abrasive users obtain greater economic advantages than they are presently realizing?

2 What equipment at the Machine Tool Exposition will have the greatest effect on the grinding and and finishing processes in the next five years?

3 In what areas can the users obtain the greatest benefits from present day developments of grinding and finishing abrasives, equipment or processes?

THE ANSWERS

1

In what areas can abrasive users obtain greater economic advantages than they are presently realizing?

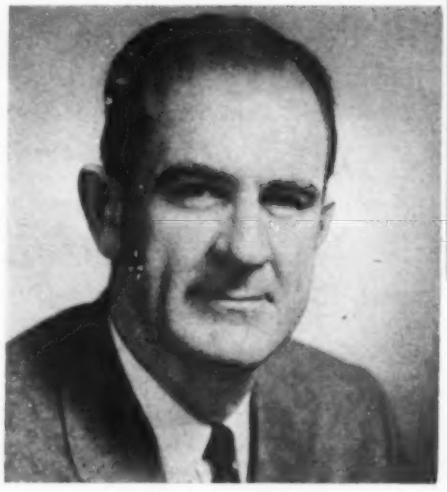
The use of engineering data and help from manufacturers can greatly increase the economical advantages to users. Trying to standardize the abrasive to a number of jobs and buying abrasives on the initial cost are only two examples of great waste in the application of grinding and finishing. For the most profitable use of abrasives, each application should be engineered. This service is available to the user from the machine and abrasive manufacturer at little or no cost. This experience is not now available within many of your companies.

Recent developments of abrasives, machines and application stress the need to utilize engineering service. New products go through a long period of test and evaluation before being offered to the general field

1960 developments?

William H. Baudouine
Elgin National Watch
Abrasive Div.

Harley J. Hiscock
Fuller Merriam Company



Elden L. Auker
Bay State Abrasive Products Co.

Leslie B. Bellamy
Peninsular Grinding Wheel Co.

and in this process a great deal of information is gathered which can be very beneficial to the user. Higher speed wheels are now available which provide greatly increased stock removal rates and help reduce costs. Combining higher speed wheels with the increased horsepower of machines further increases stock removal rates.

Standardization is still a splendid way to cut costs. Many of the leaders are quick to point out that specials are often used where standards would be much more practical. Close cooperation with the manufacturers with the aim of using standard machines and wheel shapes or belt sizes will greatly reduce grinding and finishing costs.

Bay State's *Elden L. Auker* says, "Abrasive users today do not take full advantage of the abrasive know-how made available to them by the grinding wheel manufacturers. Grinding wheels and their application is highly specialized, both in the wheel manufacturing process and their application." *Harley J. Hiscock* of Fuller Merriam added, "Grinding wheel manufacturers provide their customers a greater amount of engineering information than is provided by any industry of comparable size. Users should take more advantage of this help, not only in connection with existing grinding wheel uses, but in the early planning stages. At this point a decision for grinding instead of a competitive process will, in many cases, provide substantial cost savings."

"We feel that diamond abrasive users," says *William H. Baudouine* of Elgin National Watch Abrasive Division, "can obtain greater economic advantages, by placing more responsibility with the manufacturer for research and application engineering of industrial diamond requirements within the user's operation." *Leon A. Patt,* Carborundum, commented, "Many grinding wheels are purchased on a price basis which is usually false economy. The abrasive user's main interest should be in the cost of doing the job rather than in the price of the grinding wheel."

Feeling the industry had work to do, Peninsular's *Leslie B. Bellamy*

J. F. Whitcomb
Minnesota Mining and Mfg. Co.

Jim Bair
Fox Grinders, Inc.

W. G. Pinkstone
A. P. deSanno & Son

L. R. Rothenberger
DoAll Company

says, "1960 re-emphasized the need for increased liaison and cooperation between machine designers and wheel manufacturers. The potentiality of grinding wheels for stock removal has hardly been explored so that we find many parts being turned and milled with tungsten carbide tooling which can be ground faster and cheaper."

J. F. Whitcomb of Minnesota Mining and Manufacturing also felt additional cooperation is required, only in a little different direction, "Industry does not realize the full capabilities of coated abrasives and the machines on which they are used. In many cases, abrasives are replaced after they are worn, but before they are worn out. Similarly, most grinding machines are being worked far below their rated capacities."

"Replacing obsolescent machines with some of the newer models," says *R. B. Schofield* of Airbourne Instrument's Lab Division of Cutler-Hammer, "offers greatly increased capabilities both in rate of stock removal, and in accurate part sizing. Newer, heavier, and more powerful grinders can be further enhanced by the application of proved feedback techniques so that higher accuracies can be achieved without sacrifice of production rates."

Standardization and greater understanding are the points made by *W. G. Pinkstone* of A. P. deSanno & Son when he states, "If during 1961 the users of grinding wheels will accept and rigidly enforce in their own plants the provisions of the Safety Code and the Standards Code of the American Standards Association, they will benefit greatly . . . then, there is the important practice of running tests to improve on existing conditions—a better understanding of the 'trial wheel' will produce important benefits to the user."

J. F. Claydon, Carborundum, gave the users a pat on the back, "Consumers of coated abrasives are looking more and more at total costs rather than one element of cost such as abrasives."

Standardization was also foremost in the mind of *G. F. Kohn,* Precision Grinding Wheel, when he comments, "Users would profit greatly were they to work with the industry more closely towards standardization. Standard wheels are supporting the specials and those buying the specials pay too little and those buying the standards cannot enjoy such economies as might be affected . . . since the grinding wheel industry apparently is not interested or able to eliminate a great many of the specials, it must emanate from the user if he is to benefit economically therefrom."

Jim Bair of Fox Grinders, speaking of snag grinding reported, "Economic advantages can be realized in both these fields by the use of higher speed equipment and, of course, suitable types of grinding wheels to be used with this equipment. It has been noted that grinding economies of approximately 25% can be ob-

Wallace B. Bainton
Brown & Sharpe Mfg. Co.

G. W. Balz
Roto-Finish Company

H. H. Whitmore
Jones & Lamson Machine Co.

tained by equipment designated to operate wheels at 12,500 surface feet per minute." The same thinking prevails with regard to surface grinding in DoAll's *L. R. Rothenberger's* statement, "To be competitive in 1961 the users of surface grinders must have and use modern machines. Present day machines provide faster stock removal, to closer tolerances, due to more rigidity, horsepower and better application of coolant.

Brown & Sharpe's *Wallace B. Bainton* indicates that abrasive operations will go much farther in accuracy "Further introduction of machines and accessories capable of sizing diameters to a few millionths and roundness and straightness within the same tolerances will be accomplished by comparatively unskilled operators. Another advance in the art of grinding is the introduction of optics to grinding machines, which makes it possible for comparatively unskilled operators to work to close tolerances."

In the field of barrel finishing and vibrational finishing, Roto Finish's *G. W. Balz* believes, " Greater economic advantages can be obtained by more scientifically controlled processes; specifically, choice of exact abrasive media and compound, selection of the proper load size and speed of vibration or barrel rotation, and utilization of the latest types of finishing and separating equipment."

A number of men were impressed by more specific 1960 developments such as *H. H. Whitmore*, Jones & Lamson, "In our opinion, devices using rotating cemented diamond particle cutters have opened up a completely new and most efficient method of form control on grinding wheels."

"In the cleaning and finishing of metal surfaces by the air-blast method," states Exolon's *R. P. Harty*, "the use of fused aluminum oxide abrasive grain will offer definite advantages where greater speed and a better finish are desired."

S. H. Miller, Hammond Machinery Builders, says, "In our opinion, you will find a growing use of coated abrasives on platen type grinders now available with new water-cooled platens which dissipate heat."

Referring to tool room grinding, Anocut's *C. R. Stroupe* reports, "Electrolytic cutter grinding offers the user a more significant reduction of abrasive costs and labor time than any other electrolytic carbide grinding operation. Abrasive cost reduction can be as much as fifteen to one and reduction of labor time of five to one or six to one is common."

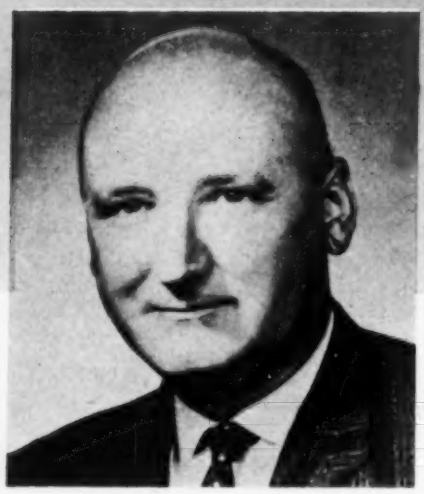
Richard Allchin of Rotor Tool restricted his comment to portable air tools. "It is interesting to note a continued and increased emphasis of planned capital expenditures to replacement and modernization. Within the context of portable tools, and similar small capital items, factory executives and controllers are becoming aware of the low capital investment per labor dollar, and the effect of replacement and modernization for labor cost savings to pay for such equipment."

R. P. Harty
Exolon Company

Richard Allchin
Rotor Tool Company

2

What equipment at the Machine Tool Exposition will have the greatest effect on the grinding and finishing processes in the next five years?



G. P. Burns
Van Norman Machine Co.

H. G. Bixby
Bryant Chucking Grinder Co.

W. F. Schlick
Sterling Grinding Wheel Co.

In response to this question, a number of specific items were named; however numerical control and automation seem to have been the two considered by almost all as the most important areas of benefit to the user. As in the response to the first question, higher speeds and horsepower, form grinding, new methods and applications were also frequently referred to as having the potential for greatly affecting the grinding and finishing processes.

G. P. Burns of Van Norman Machine felt that the basic machine tools while not necessarily new have been improved considerably in stating, "The area of newness was developed by new methods and applications of work to machine tools. Today we can remove .200 inches of stock from a piece of steel in a matter of fifteen seconds, producing a complete contour, to a precision tolerance, employing crush dressing. This was unheard of a few years ago. At the same time, we can employ

the full horsepower of a machine in acquiring this rapid stock removal, which again increases the over-all efficiency in production."

Concerning numerical control, *H. G. Bixby* comments, " In grinding as well as other machining operations, the Chicago Exposition revealed that numerically controlled machine tools are going to have a far-reaching effect in the immediate future. For example, all the advantages claimed for tape controlled milling operations—less lead time, less tooling, less production time and greater accuracy—also apply to tape controlled grinding, particularly in the manufacture of cams and templets." Sterling Grinding Wheel's *W. F. Schlick* says, "The main theme of the Machine Tool Exposition was automation with tape programming. It is the responsibility of the abrasive industry to develop products to be used with this equipment to give the users more efficient grinding at lower cost." *A. C. Reppenhagen, Jr.*, Midwest Abrasives, also found automation most important stating that, "The full utilization of the many and varied automated machines offered by this exposition will tremendously enhance our own industry and, in turn, will make giant strides toward operational perfection for our customers."

E. A. Kowalski of the Chicago Rubber Company was impressed by the coated machines. He stated, "I believe centerless grinding with coated abrasive belts will make eht greatest effect on grinding and finishing processes. I base this on seeing some of the new automatic equipment and reports on others on the drawing boards."

In more specific areas, automation was still the crux of the remarks such as *D. S. Connor's*. "Honing equipment exhibited at the Show demonstrated that by the extension of the unique features of the honing process to a wider variety of critical functional surfaces, and techniques for controlling the action of the abrasives and increasing production will provide economic advantages to the user." *J. C. Wilson* of Thompson Grinders reports, "The machines having the greatest effect will be those which have automatic feed control, eliminating the human effort." Both *S. M. Napp* and *J. T. LeBeau* were specifically interested in the disc grinders which they feel will, "change the present thinking as to the quality of work and as to tolerances and finish that can be produced by disc grinding."

W. Kent Mathias, Cincinnati Milling stated, "Much has been done by the grinding machine manufacturer over the past 10 years to cut precision grinding costs of high volume work, but the Numerically Controlled Centertype Grinding Machine is the first major advance in grinding machines to help the low volume producer in his battle against rising costs."

A. C. Reppenhagen
Mid-West Abrasives Company

E. A. Kowalski
Chicago Rubber Company, Inc.

D. S. Connor
Micromatic Hone Corp.

W. Kent Mathias
Cincinnati Milling & Grinding Machine, Inc.

3

In what areas can users obtain the greatest benefits from present day developments of grinding and finishing abrasives equipment or processes?

John Jeppson
Norton Company

Alan Mattison
Mattison Machine Works

F. L. Meacham
Simonds Worden White Co.

The third question brought a number of similar answers to the first question which lent impetus to the importance of these answers. Combined efforts of the abrasive manufacturer, machine manufacturer and user were emphasized as being extremely important in obtaining benefits for the users' operations. High speed, high horsepower, automation, accuracy, form grinding and new abrasives and bonds were comments which were repeated in answer to this last question. In addition, a number of more specific areas were covered such as vibrational finishing, which was not displayed at the shows, tool room grinding, constant peripheral speed, and automatic cut-off machines.

John Jeppson, Norton, believes, "Improvements in abrasives and bonds and in the manufacture of grinding wheels are beginning to indicate greater economic advantages in other than the traditional areas where abrasives have been used for decades. *Alan Mattison* of Mattison Machine Works felt there were a number of areas which could provide benefits, in saying, "There are four general areas in which machine and abrasive developments can increase quality, reduce machining costs, or both. These include abrasive belt grinding and polishing, mass production of flat pieceparts, precision tool and grinding and short-run, high stock removal surface grinding." "Users of other tools for metal removal should benefit greatly from the work done by the wheel industry," says Colonial Abrasive Product's *A. J. Sandorff*. "The use of grinding wheels for the removal of metal where these other tools are now used offers the biggest field for the industry and the users who switch to wheels will be the ones who will benefit most in the future from the progress of the grinding wheel manufacturers."

F. L. Meacham of Simonds Worden White also feels that increased application can be of benefit, stating, "Products which are now being produced can be finished by grinding processes in the hardened condition; other products can be produced of extremely hard materials when grinding is used as the finishing process, whereas these

Leaders Explain:

Not enough users are taking advantage of the industries background and engineering service for the most beneficial use of abrasives and abrasive operations.

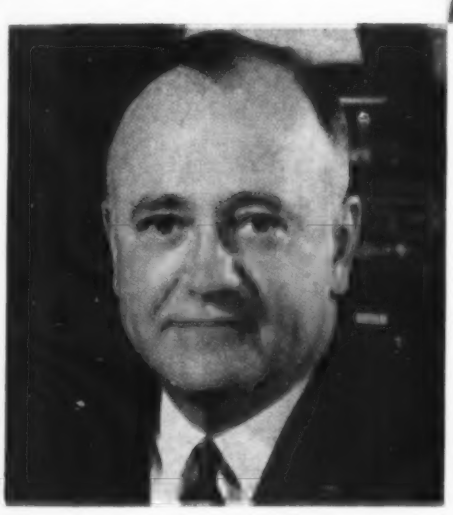
Applications of abrasive operations are being overlooked particularly in the area of new developments such as higher speeds, higher horsepower, increased stock removal and greater accuracy.

Automation and numerical control are now important factors in grinding applications and must be considered when making methods decisions.

Dirck Olton
Behr-Manning Co.

W. L. Kenagy
Simonds Abrasive Company

James S. Tomlinson
General Abrasive Co., Inc.



Frederick S. Blackall, Jr.
Taft-Pierce Manufacturing Co.

products which are to perform the same operations have to be made of much softer materials if conventional cutting tools are to be used in the finishing." *Dirck Olton* of Behr-Manning Company expresses the opinion that progress had been made in this direction, "Our long-held concept of the abrasive belt and the machine that drives it as true machine tools became a reality in the fullest sense this year. In 1960, we saw the steel industry accept belt grinding as a basic weapon in its production arsenal. Coated abrasives have demonstrated their performance in heavy stock removal when run on machines stout enough and precise enough to let them work at their best."

The subject of speeds entered into the remarks of *W. L. Kenagy* of Simmonds Abrasive Company. "We believe grinding wheel users can obtain improved results with today's bonded abrasive products and grinding machine equipment by closer adherence to constant peripheral speeds." Speed was also the subject for *Frederick J. Darby* of American Emery Wheel when he said, "With depressed center wheels particularly radical changes in the shape and in bonding and reinforcing techniques are now producing wheels that are unexcelled for safety and performance at speeds up to 14,200 surface feet per minute."

J. S. Imirie, Carborundum, feels benefits are greatest in the precision areas. "In this 'Space Age' the manufacturer of loose abrasive is called on to provide ultra-fine abrasive powders for the lapping of component parts of electronic devices used in missiles, satellites and related equipment." *James S. Tomlinson* also is impressed with the abilities of new grains stating, "During the last few years several new types of aluminum oxide abrasives have been developed to provide greater toughness or more precise degrees of friability. New treated grains, such as waterproof coated grains, have been introduced to make abrasives more responsive to the requirements of abrasive users." On the same subject, Armour Alliance's *R. L. Heiniger* believes, "We feel the dramatic improvement of resinoid bond and waterproof products is one area where immediate benefits can be reached. This family of products has given the metal working and finishing industry greater stock removal, better finishes and greater production."

Frederick S. Blackall, Jr. of Taft-Peirce is more specific in his remarks, "Microstoning which produces controlled micro-inch surface finish and simultaneously corrects geometric errors in the work has gained widespread acceptance as a finishing method in Western Europe." "Finish grinding of very complicated profiles rough formed by 'chipless or explosive machining' will become a very promising field in the next five years for abrasive grinding," remarks *Robert Sheets,* Sheffield Corporation.

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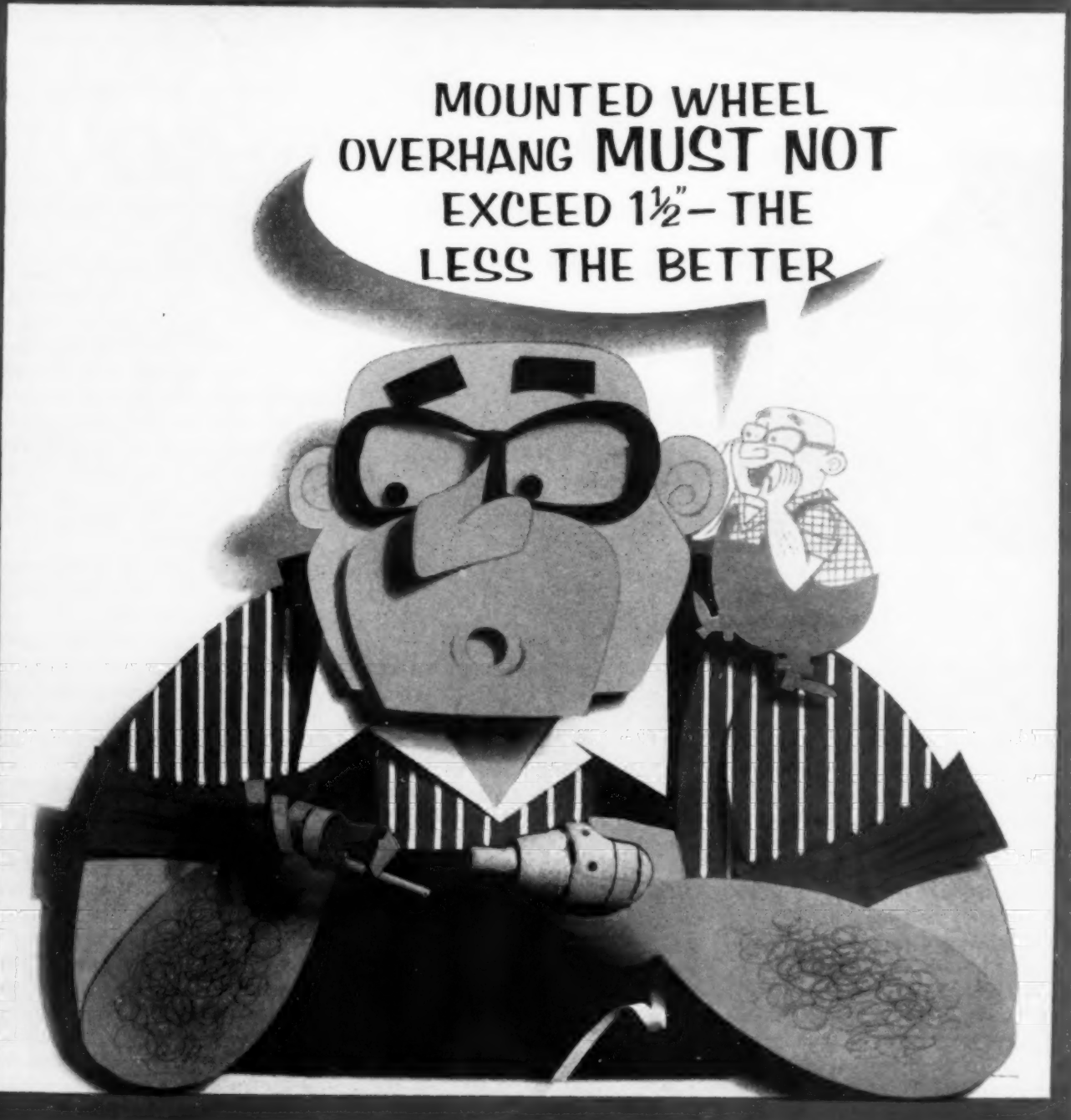
SAM SAFETY says:



How a wheel is developed

More research and development goes into the manufacture of a wheel than is often realized. What prompts development of a new wheel? How are its benefits determined? What steps are taken in its evolution? Because Norton recently announced their new 75 Alundum high speed snagging wheel we asked them to answer these and other questions.

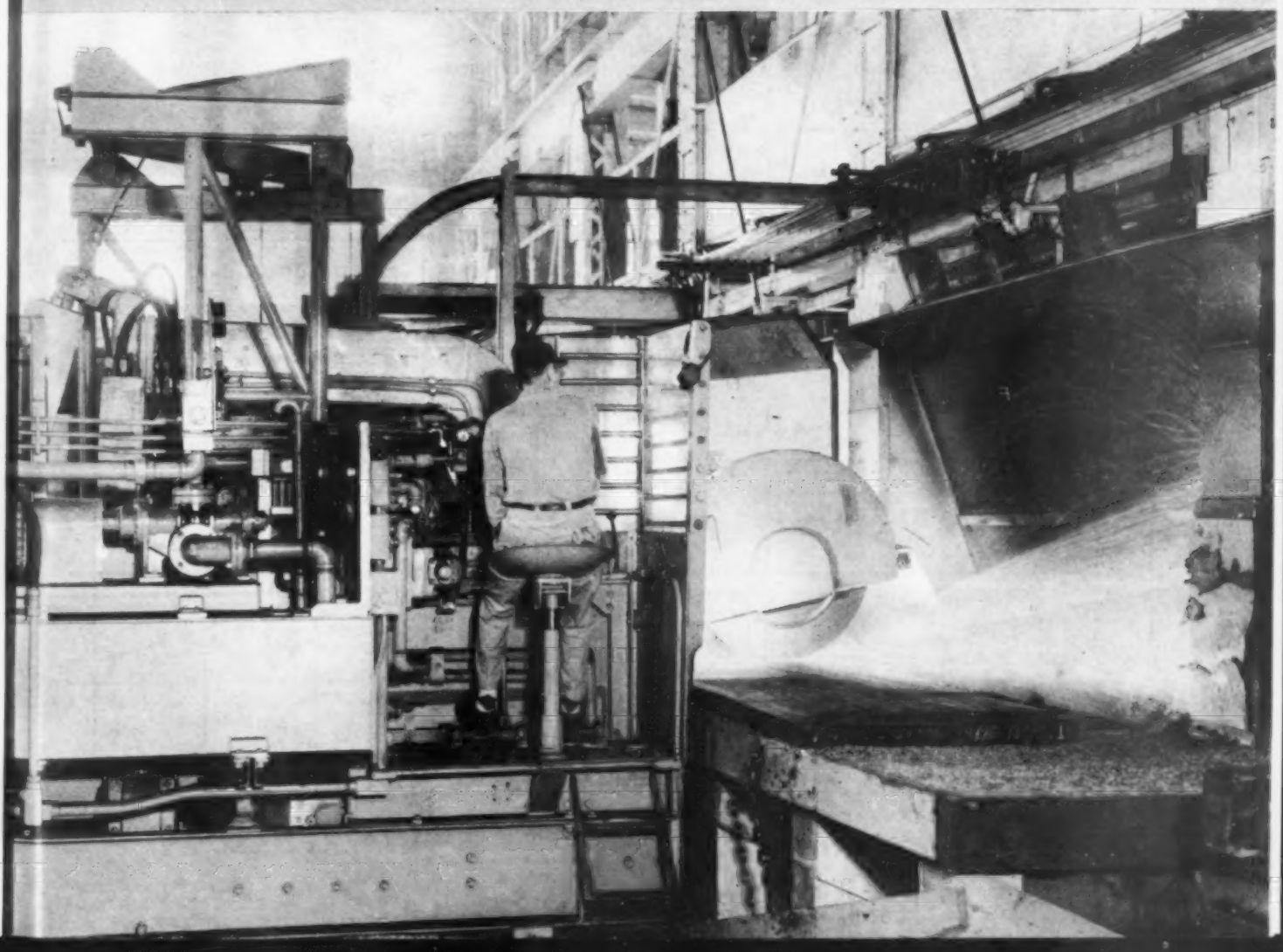
By JOHN CLARK JR.
Product Engineer
Norton Company

● Grinding wheel makers and users alike have long recognized that increased speed and pressure in the rough grinding of metal would probably mean greater efficiency and lower cost. As early as 1933, H. W. Wagner of the Norton Research and Development Department made a study on the subject. At that time, the lack of strength in the wheels then available discouraged further investigation.

However, by 1950, wheel improvements had progressed to the point where Norton Company initiated a research project to investigate more fully the subject of high speed and high pressure grinding. To implement the project, an automatic grinder was built to meet the needs for testing under these elevated conditions. This was designed solely as a testing device. Simultaneously, high priority was given to developing a new abrasive especially created for the conditions found in such machines.

During the life of the project, three separate test machines were developed, each more powerful than its predecessor. The final model of test grinder was built in 1957. It mounted 36" diam-

Large test grinder built by Norton Company to investigate advantages of high speed, high pressure grinding on stainless steel slabs. Machine weighs 25 tons, can exert a pressure of up to 1300 pounds and will remove as much as 730 pounds of steel per hour. Curves showing effects of wheel speed and pressure when grinding stainless steel.



eter wheels and was capable of exerting 1300 pounds of force on the work. It would grind slabs up to five feet in width and remove as much as 730 pounds of stainless steel per hour.

Extensive tests were run early in 1958 with this machine under the same conditions found in many stainless steel grinding mills. The curves in Fig. 1 show that even though the wheel wear increases with increased pressure at constant speed, the rate of metal removal increases sufficiently to actually lower the cost per pound of metal removal.

The curves in Fig. 2 show that the rate of wheel wear decreases and the rate of material removed increases with an increase in wheel speed, resulting in a marked decrease in cost per pound of metal removed.

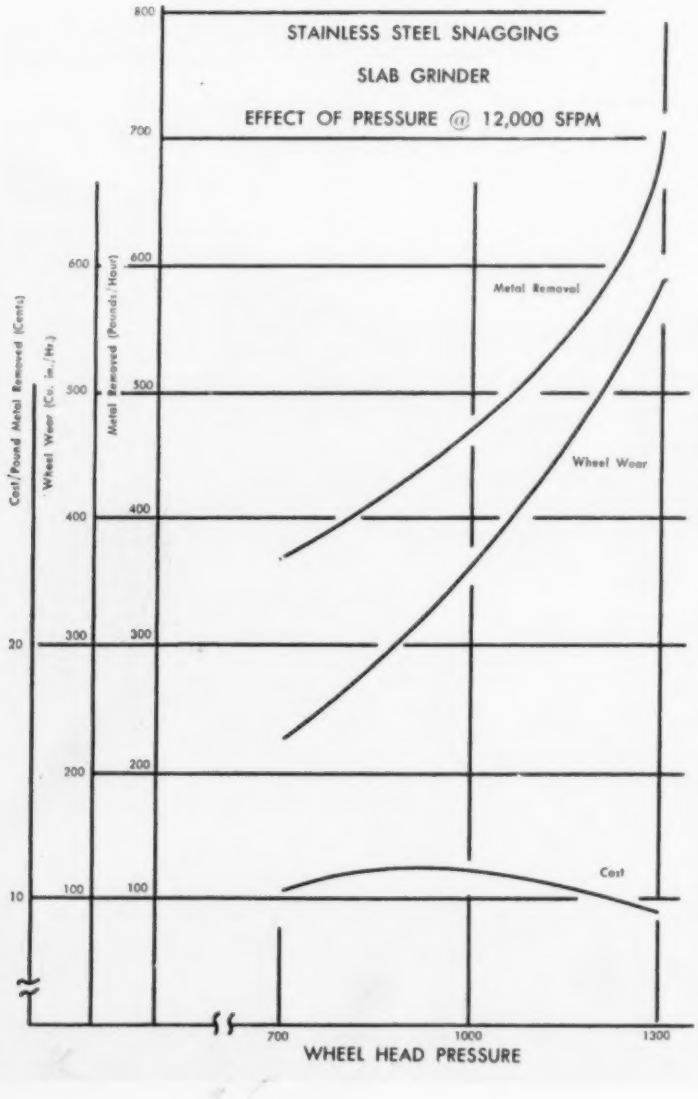
The original contention that higher wheel speeds and pressures would prove to be economical was borne out in this first phase of the project.

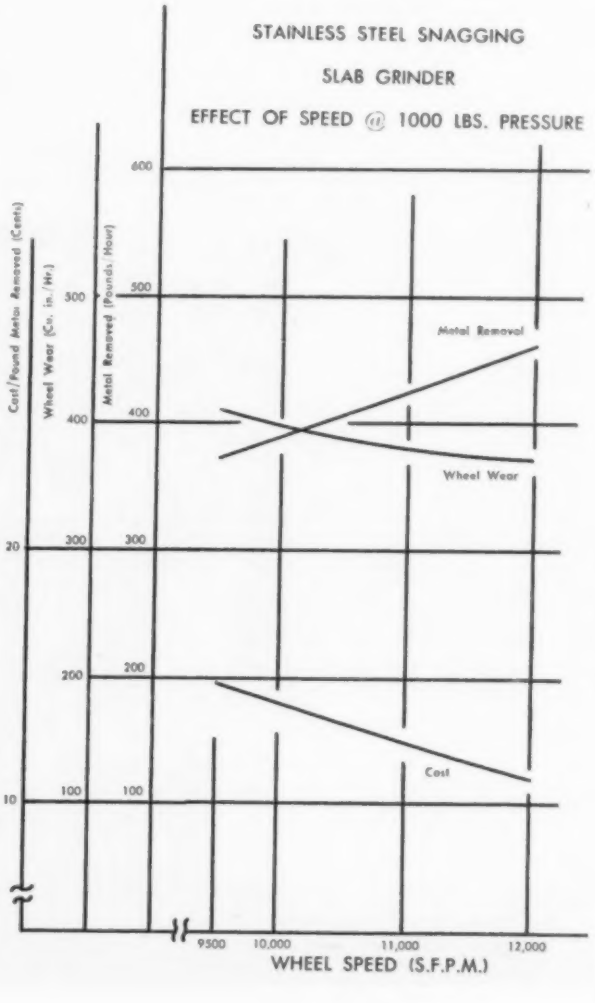
The new abrasive was made into snagging wheels using BZZ bond under new conditions of manufacture which resulted in a grinding wheel specifically made for the hard usage on mechanical grinders now used in the steel industry. Under the severe pressure and speed conditions encountered in the large test grinder, fast rate of cut and very long wheel life reduced the cost of metal removal as much as 40%.

Exhaustive tests of safety were then conducted to prove that this deviation from accepted normal maximum operating speeds was not only economical but safe to introduce to industry. Under controlled conditions, a conventional swing frame grinder was suspended within a heavy wooden timber enclosure. It was counterbalanced to simulate the actual grinding conditions without an operator present. Conventional snagging wheels of the types in use at the time were broken by rifle fire while operating at speeds ranging from 13,000 sfpm to 18,000 sfpm, well above the approved 9500 sfpm operating speeds of these wheels.

A Marine Corps marksman from the nearby Reserve Training Center broke the wheels with a service rifle firing armor-piercing type ammunition.

High speed motion pictures (3000 frames per second) were taken of the breaking wheels to slow the action enough to permit study of the





Steps Taken During the Wheel Development

- What is the user's need?
- Evaluate the theoretical direction for development.
- Develop test equipment or setup.
- Test wheel of grain and bond in the theoretical directions selected.
- Determine value of test results for improvement in performance and economy.
- Test for safe operation.
- Field test under actual operational conditions.

fragmentation. The camera crew was located in a bunker built of heavy timbers about 20 feet from the burst. Heavy safety glass protected the camera lens.

"Inspection of the guard after each wheel breakage showed evidence of some minor distortion of the side members but no indication of any actual failure of the guard," said Gilbert R. Blake, Norton's Product Safety Engineer. "However, fragmentation of the wheel was observed to be much greater at the higher speeds. The wheel fragments became progressively smaller as the bursting speeds were increased.

"The marked increase in fragmentation resulting from the higher bursting speeds clearly indicates that conventional guarding, as used in this test, would not furnish adequate operator protection if breakage occurred at wheel speeds in excess of 9500 sfpm."

Examination of the high speed motion picture film showed several things of importance, all of which indicate that wheel speeds higher than 9500 sfpm cannot safely be used on hand-operated swing frame grinders. Even though the handle bars were weighted with 20 pounds of sand, the grinder jumped upward as the wheel broke, raising the handles about two feet. The handles were bent as the weight of the sandbags tended to hold them in place after impact. This clearly pointed out that it would have been impossible for a man to hold the grinder after a breakage at high speed.

The movies also showed that large and small fragments alike flew through the space that would have been occupied by the operator, as high as five feet from the floor.

Norton Company has approved the use of its properly designated wheels for operation up to 12,500 sfpm on mechanical grinders (*not hand-operated swing frame grinders*) which have conventional heavy guards. In addition to the heavy guards, it is also recommended that these additional means of protection be provided for high speed grinding wheel operation:

1. Special safety enclosure for the operator; generally a remote control booth or cab equipped with a thick safety glass panel.
2. Steel safety enclosure or hanging chain mesh curtains around the grinding wheel head as close to the slab as possible to catch flying wheel fragments.
3. Steel safety screens or sheet metal enclosures around the entire grinder to protect against fragments which escape other protection. The entire machine must be guarded.

"Experience has proven," said Blake, "that these precautions are adequate for occasional accidental wheel breakages occurring at speeds up to 12,500 sfpm. Of course, all other mounting and operating safety regulations must be observed. Particular attention to possible flange damage after a breakage will prevent an immediate recurrence. Flange condition is an important consideration if unnecessary breakages are to be prevented in this area of high speed grinding wheel usage."

Once the theoretical advantages of higher speed and pressure grinding had been proved, a new abrasive developed and the finished product tested for safe operation, there was still testing to be done in actual field test operations.

Working in cooperation with some of the nation's leading stainless steel producers, Norton engineers supervised tests of the new wheels on actual production jobs. Conditions here were not those of the controlled experiments in the laboratory but the actual on-the-job conditions in which the new abrasive would have to meet and beat its competition if it were ever to become a useful addition to the product line. • • •

Editor's note:
While we have chosen Norton due to its recent announcement, the other important wheel manufacturers take these same careful steps to provide quality wheels for their customers.

The marksman and the target. When broken with a service rifle, the snagging wheel being run in this protective wooden enclosure broke into hundreds of fragments. The fragment size became smaller as the speed was increased during the series of tests.

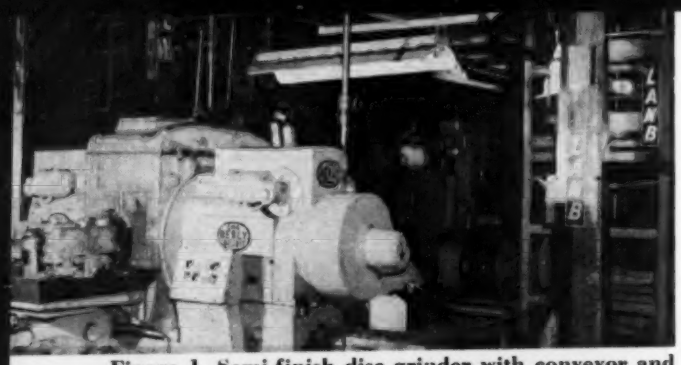


Figure 1. Semi-finish disc grinder with conveyor and storage equipment. Parts are fed from the left.

AUTOMATED DISC GRINDERS Hold Tenths, Hike Output

Engineering know-how combined with advanced double-spindle disc grinder design and needle-point gaging produces a flexible, high-production, tenths-tolerance unit.

By RICHARD L. McKEE
Managing Editor

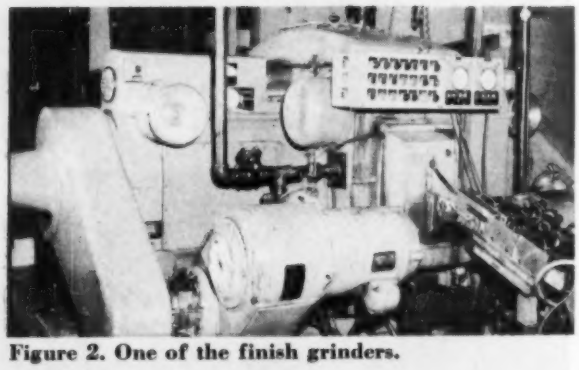


Figure 2. One of the finish grinders.

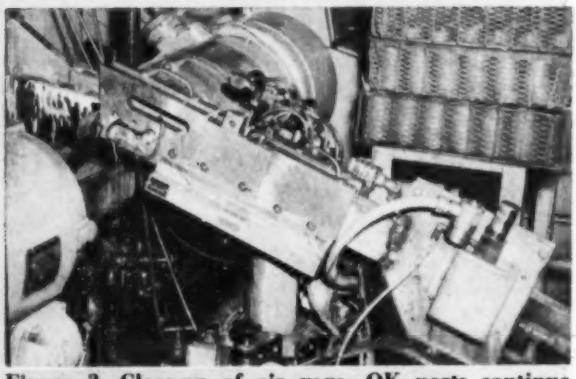


Figure 3. Close-up of air gage. OK parts continue on the track just above the lower right corner.

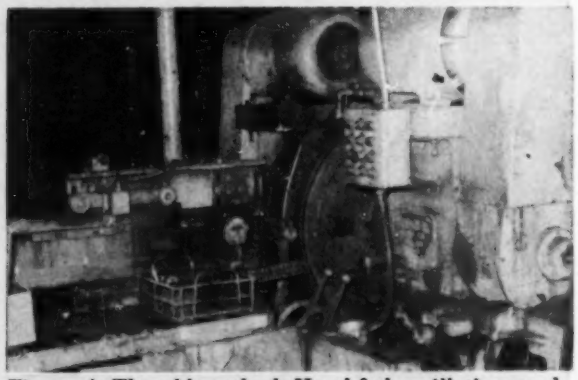


Figure 4. The old method. Hand-fed oscillating work-holder is precise, but not fast enough.

● "This job," said the Besly abrasive engineer, "was to double disc grind the parallel sides of a ring fitting into a pump which is a critical part of the power steering unit for automobiles.

"The tolerances customer wanted (in order to increase greatly the efficiency of the pump) were fantastic, based on any previous accomplishments of disc grinding anywhere . . ."

Said the customer's engineer: "We needed a ring (Figure 5) with sides parallel and flat enough to hold an oil seal under 1200 psi. Quality was the major problem, with labor a close second. The old method, manually-fed double disc grinders (Figure 4), was being used to capacity. Any increase in production would have involved more men as well as additional machines . . ."

This is the problem which led to a substantial investment for finishing the sides of the pump ring. Approximately half is in three Besly-Welles DH-4 double spindle disc grinders (one for semi-finishing, two for finishing), and the rest in gaging, coolant system, and feeding, storage, and conveyor equipment. Grinding the inside of the ring is another story, and the O.D. does not require finishing.

Tolerances being held on finished parts at the present rate of 600 plus per hour are ± .00015" for size; .000025" for flatness; and .000025"-.000070" (25 to 70 millionths) for parallelism. A half-hour's observation indicated that most finished rings were well within tolerances, and slightly on the high side. The effect of still closer limits is achieved by separating the highs from the lows at final inspection.

Comments the user, "We could hold to plus or minus half a 'tenth' on these machines, though hardly at our present high production rate of more than 600 parts per hour."

Technically the line is ingenious. One of the problems in test grinding was handling the parts from grinder to gages for checking. The heat

from the operator's hands could throw an acceptable part out of tolerance. This dictated that there MUST be complete automation, with parts going from one grinder to another in a track and feeder system, and into and out of gages automatically, and the gages automatically compensating the grinders for abrasive wear.

Engineers from the using firm say, "Another problem is to keep the coolant cool enough. If it gets too warm, acceptable parts may shrink out of limits at final inspection. It should be about room temperature.

"Getting the gaging right was almost as much a problem as setting up the grinders. The gage is about a foot and a half away from the grinder and is continually splashed with coolant. The four holes in the ring (Figure 5) were a difficulty. However, we use a two-nozzle gage so that if the first hits a hole, the second is actuated."

The operation sounds simple.

Parts to be finished are dumped into a vibrating hopper to be shaken down onto a track sloping down to a V-belt feed device. Rings are fed through the semi-finish grinder in a continuous line (Figure 6). Perhaps as many as a dozen may be between the discs at any moment. This grinder operates at a rate of about 1200 parts per hour.

Acceptable rings are raised into a Lamb storage conveyor, from which they move in lock-step to one of the finish grinders.

Rings are fed through the finishers one at a time (Figure 7) at a rate of about 300 per hour. They are checked (Figure 3) on a two-nozzle Moore air gage as noted above.

Rings within tolerance continue on a conveyor to be spot-checked for taper on a dial indicator by the operator. Others, the majority of which are slightly oversize, drop to a lower conveyor for reprocessing.

Rings slightly undersized on the semifinisher and slightly oversize on the finishers are accumulated for special finishing runs, with very light stock removal.

"Zoned" discs (Figure 8) are used in all three grinders. Specifications for the semi-finishers are: C60-I/H 12-BDN, 30 x 1 x 20 x 1. On the finishers, the disc specifications are: C60-F/E 12-B2DN, 23 x 1 x 17 x 1.* The finishing discs are smaller and softer, with a different resinoid bond. In abrasive, grit size, and structure, they are identical.

The original proposal called for four grinders, one for semi-finishing and three for finishing, but production levels warranted only two finishers. Space was left for a third finish grinder, as in the original layout. A foundation was poured for it when the present machines were installed. Adding the machine would involve only minor expense over its actual price.

Four men, two each on two shifts, are required per day. The same force can handle an extra grinder whenever the production level warrants the change. • • •

Figure 5. Side view of pump ring. Four holes through ring caused problem in gaging.

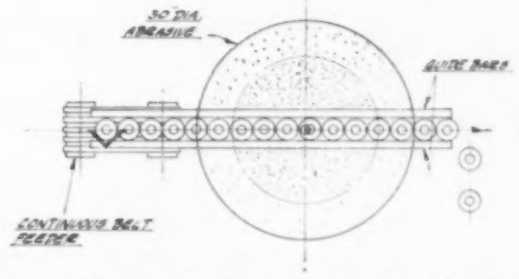


Figure 6. Through-feed system on semi-finish grinder provides high production, is precise enough for the semi-final stage of the finishing process.

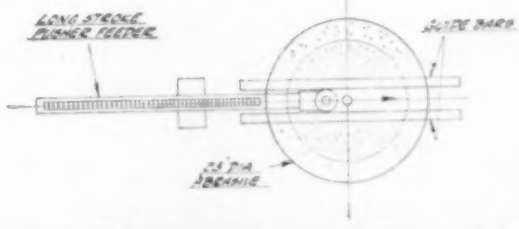


Figure 7. Through-feed system for finish grinders. Feeding discs singly provides "tenths" precision.

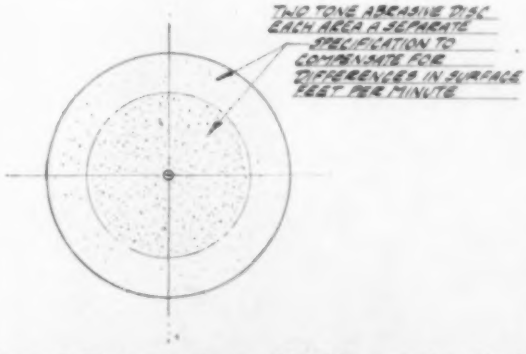


Figure 8. Two-zone disc used in this operation. Zoning compensates for variation in abrasive speed (sfpm) as the workpiece travels across the disc.

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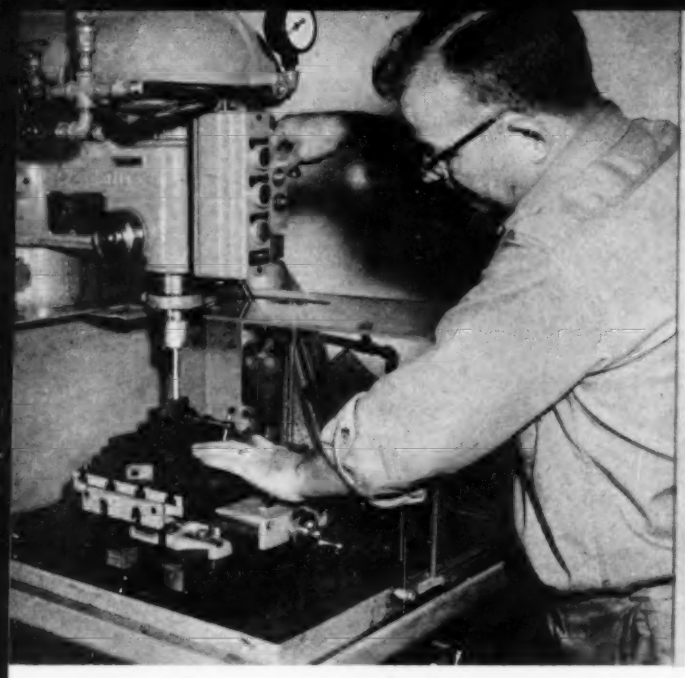
*Disc markings like these vary somewhat from standard grinding wheel markings. The specification for the semi-finish discs (30 x 1 x 20 x 1, C60-I/H 12-BDN) is a good example. It is read as follows:

The over-all diameter of the disc is 30″; it has 1″ thickness of usable abrasive, a 20″ diameter inner zone, and a 1″ hole. (See Fig. 8) The disc is made of 60 grit silicon carbide—I grade in the outer zone, H grade in the inner zone; 12 structure; resinoid bond.



ECONOMICAL, ACCURATE HOLE-MAKING in exotic metals

By W. H. HAMPTON, President, and
W. RAYMOND SHAW, Chief Engineer
Hoffman Bros. Drilling Company

Coring exotic metal with diamond-impregnated bit on Buffalo drill press.

New diamond impregnated core bits and compatible drill presses make accurate hole-making in any metal economically feasible for any shop, eliminate secondary finishing.

● In the first major test of making holes in tungsten carbide with a new diamond impregnated coring tool, hole drilling expense dropped from a total of about $80.00 to a minimal $1.20. Such a result, even if liberally discounted as preliminary, forecasts a new era in working the "exotic" hard metals.

Lack of a practical, precise and economical method for coring these space age materials at a production level has been one of the major obstacles in the way of their wider acceptance. The cost of these methods is relatively high. At times they damage or change the character of material adjoining the hole.

Research Program Started

This situation sparked a research program initiated in 1956 by Hoffman Bros. Drilling Company, Punxsutawney, Pa., and completed jointly with Kennametal, Inc., Latrobe, Pa., and Buffalo Forge Company, Buffalo, N.Y.

Its results have been the development of a complete new line of Hoffman diamond impregnated core bits, trademarked Metoram, and of a new No. 18 Buffalo drill press which meets the requirements of the operation for high speed, accuracy, and rigidity. The press was designed to incorporate the advantages of accurately controlled fluid and static pressures with the use of a hollow spindle.

All of the core drilling test results reported below are based on the performance of Hoffman Metoram bits used with No. 18 Buffalo drill presses.

Drilling Costs Reduced

Succeeding tests confirmed the preliminary findings. On one sample of K-164B tungsten carbide, 51" were drilled for a total outlay—including labor, materials, and overhead—of less than $1.00 per inch, compared with a previous $16.00. Typical reductions on other materials per inch drilled are the following:

Material	From	To
Fired Silicon Carbide	$2.85	83¢
Beryllium Oxide	70¢	25¢
High Density Aluminum Oxide	74¢	26¢
Sintered Barium and Iron Oxide	81¢	30¢

Full test results of coring a number of other extremely hard metals and metallic materials with density characteristics similar to tungsten carbide are not included, but are available on proper request.

The performance of Metoram bits is such that secondary lapping or finish grinding has been eliminated in many cases. On all materials tested to date, drilling time has been considerably less than with other coring methods, and accurate hole size can be predetermined. Finally, Hoffman Metoram bits permit coring at regulated speeds and pressures that eliminate damage or change to the work material.

Verified performance records of the coring efficiency of Hoffman Metoram core bits in eight

TEST RESULTS CORING CARBIDES WITH METORAM BITS

Product Grade	Rockwell "A" Scale	Thickness of Drilled Pieces	Metoram Drilling Time Min.	Metoram Drilling Time Sec.	Est. Conventional Drilling Time
*K - 164	84 - 84.5	1 1/16"	2	48	Regardless of type of tungsten carbide material, time to produce a hole, 3/8" dia. through 1 1/16" thick material is from 20 to 80 minutes depending upon type of equipment being used.
K - 90	85 - 85.5	1 1/16"	8	04	
K - 92	88 - 89	1 1/16"	4	34	
K - 1	89.6 - 90.1	1 1/16"	1	44	
K - 94	89.6 - 90.1	1 1/16"	2	04	
K - 84	90.7 - 91.2	1 1/16"	2	48	
K M	90.7 - 91.2	1 1/16"	5	28	
K - 6	91.8 - 92.3	1 1/16"	0	56	

*Drilling speed for the K - 164B was 4200 rpm. All other grades were drilled at 3725 rpm which is rated according to the spindle speed. Water at 75 psi fluid pressure and 85 psi static pressure was used as the flushing and cooling agent. The feed was regulated by hand, using only sufficient down pressure to maintain contact between the face of the Metoram bit and the piece being drilled.

TABLE A

different known grades of carbides are shown in Table A. Carbides for these tests were furnished by Kennametal, Inc. of Latrobe, Pa., and actual drilling was conducted under the joint supervision of Hoffman and Kennametal. A Metoram bit having an outside diameter of .388" was used in each instance to insure an accurate comparison.

Sidelight data on the tests reinforce the basic conclusions. On the K-164B sample, 51" of material were cored with a single bit before tool life and gauge were exhausted. The O.D. of the bit was reduced only from .388" to .384". Drilling time per unit on the same sample did not vary more than 19 seconds during the entire bit life. On the K-92 sample 26 inches of material were cored before the bit was consumed.

Early test results indicated that the program would meet its objectives of comparatively low drilling costs combined with the obvious advantage of greater flexibility in the placement of holes. Metoram bits produced a 32 rms finish on the first pass without need for secondary lapping. Further experimentation showed that finishes from 18 to 32 rms could be obtained simply by increasing the rpm and the fluid pressure.

No Material Damage

Microscopic and photographic examination of the drilled pieces showed no damage or deterioration to any of the carbide samples. Reporting on these results, E. N. Smith, technical director of Kennametal, had this to say:

"Four core-drilled samples, one each of grades K-6, K-1, K-94, and K-92, were examined to determine whether there was damage to the carbide in the form of fine cracks such as have been observed in some other processes used to form holes in sintered tungsten carbide.

"A Penetrex inspection of each piece showed no evidence of cracks in any of the samples. Sectioning was done parallel to the long axis of the hole and the area immediately adjacent to the hole was examined metallographically.

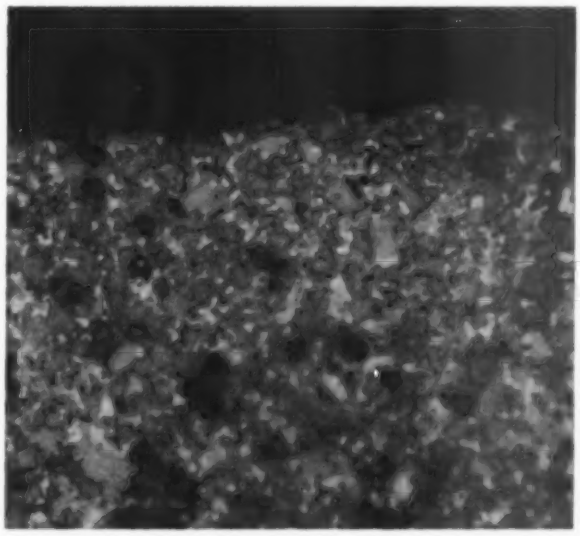
"There was no evidence of breakdown of the surfaces or change in structure. It is concluded that the method of drilling tungsten carbide with diamond impregnated core bits is a safe and practicable way to place holes in sintered carbide pieces."

Impressed by the results of preliminary research, one of the country's leading tungsten carbide users conducted independent drilling tests on their own grades of carbides. Results caused them to convert from previous carbide drilling methods to the use of Metoram bits.

In reporting the test results, the company gave these reasons for the change:

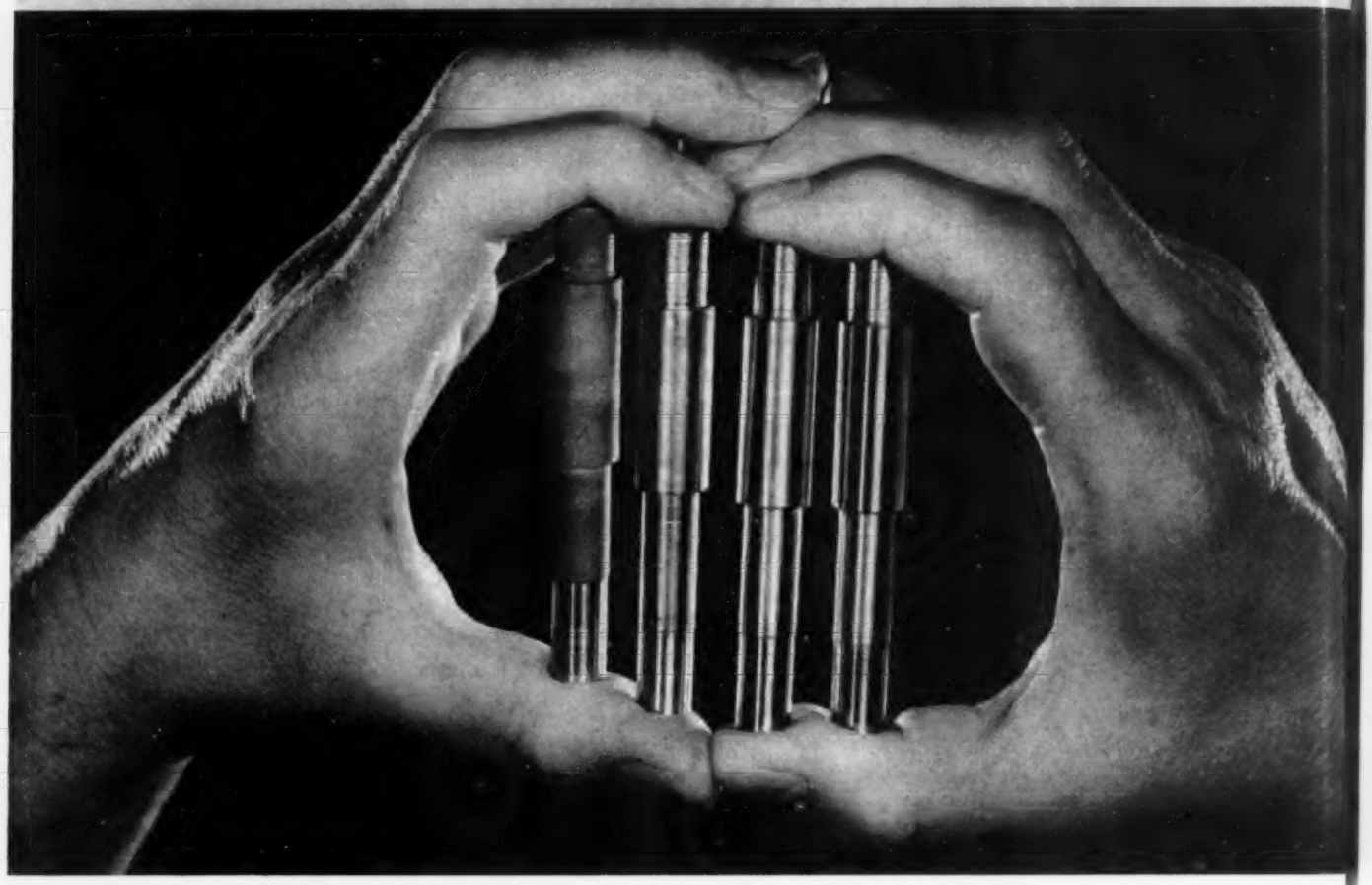
1. Greater exactness in hole location
2. No deterioration of product during drilling
3. Less time required for finishing to exact size
4. Speed of location of hole, i.e. minutes vs. hours in creating desired hole.

These results from independent tests confirm the conclusions from the four-year test program. They indicate that accurate coring of any material, no matter how hard, can be both practical and economical for even the smallest shops. • • •



Unretouched photomicrograph of K-1 tungsten carbide sample sectioned lengthwise through hole. 1500x. Structure normal for K-1, shows no cracking as a result of the drilling. Edge of hole across top.

How to finish flame-plated coatings



Shown above are four possible finishes on Flame-Plated parts, including one as-coated, by Linde Company, Division of Union Carbide Corporation. The part, as-coated, appears left. This has a finish of 125-150 RMS. Next, the Flame-Plated surface has been polished with an 80-grit rubber-bonded silicon abrasive (C-80-S11-Chicago Wheel & Manufacturing abrasive). This has a finish of 50-70 RMS.

The third in order is a Flame-Plated surface ground with a (D 220 N 100 BR) diamond wheel to a finish of 8-10 RMS. And, right, is the part ground with the same 220-grit diamond wheel, then lapped on a centerless cast iron lap with No. 3 Bureau of Standards rating to a finish of 1-1.5 RMS.

By M. A. TETER
Application Engineer
Linde Company
Division of Union Carbide Corporation

● The flame-plating process is a fast and economical method of applying thin, tenacious coatings of hard materials, such as tungsten carbide and aluminum oxide and various other materials. This process, developed by Linde Company, is used primarily in precision applications, where wear is an extremely critical factor. However, the coatings requiring finishing are only as good as the technique employed in finishing.

Although the coatings involved all have extreme hardness, conventional equipment and abrasives can be used successfully providing the techniques developed by Linde are observed. Special requirements and precautions are necessary for good results in finishing flame-plated parts to be better than 1 microinch rms, starting from an as-coated thickness as great as 150 microinch rms.

For parts requiring finishing, there are, in the main, two satisfactory finishing methods, both of which use standard types of equipment. One in-

volves precision diamond grinding or diamond grinding plus lapping. The other involves off-hand polishing with either silicon carbide or diamond abrasives.

Precision Finishing

In the selection of a diamond wheel, the bonded resinoid 100 concentrate has proved thus far to be the most satisfactory. Grit sizes in the range of 100 to 400 are acceptable, and the choice should be determined by the microinch finish specified for the as-ground surface. Either an "L" or "N" hardness wheel bond has been acceptable for all finishing done.

It is imperative to use a flood coolant during the grinding operation. Water plus one or two per cent of rust inhibitor oil is best suited as a coolant, and produces consistently good results with minimum wheel loading tendencies. Other coolants tend to cause wheels to load up. This results in a smeared or shiny as-ground surface rather than a non-glossy clean diamond-cut as-ground surface.

Infeeds per pass should not exceed .0001 to .005 in. These infeeds are for a range of 400 grit to 100 grit wheels respectively. Excessive crossfeeds, whether surface or cylindrical grinding, should not be employed. Crossfeeds from .040 to .080 in. per pass for surface grinding and from .040 to .080 in. crossfeed per revolution of the work piece in the case of cylindrical grinding are recommended.

These crossfeeds are safe within operational limits and possibly can be exceeded. With greater crossfeeds, however, there is danger of building up excessive spindle pressure and a rubbing action rather than clean cut may result.

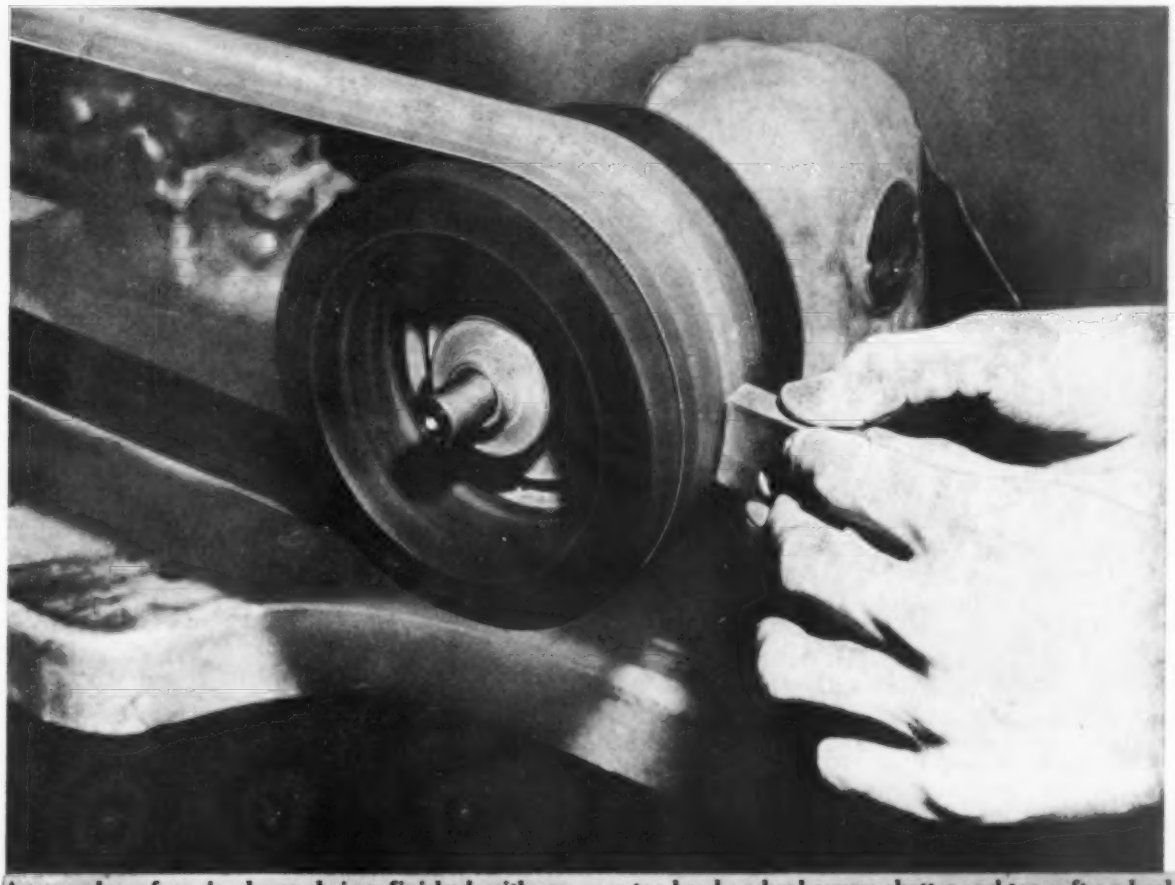
Peripheral wheel speed of from 5,000 to 6,500 sfpm are acceptable. It must be remembered, though, that the higher the sfpm, the harder the wheel acts. At 5,000 sfpm, for example, an "N" hardness wheel behaves similarly with an "L" hardness wheel at 6,500 sfpm.

A diamond wheel should be balanced initially and trued on its own wheel mount for a total maximum runout of .0003 in. Buying a separate wheel mount for each diamond wheel is economically sound for two reasons:

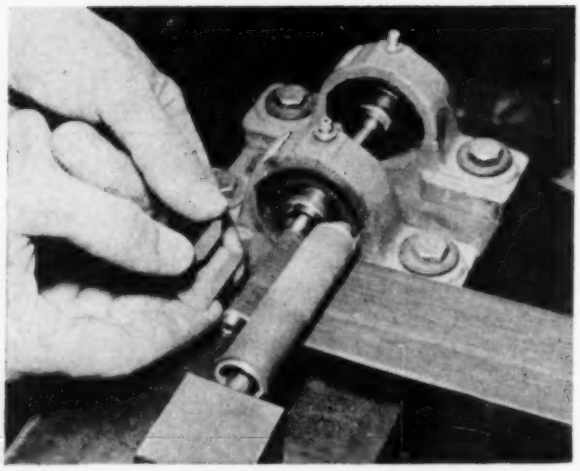
1. The labor time involved in balancing and truing each time a wheel must be remounted; and
2. The waste of diamond abrasive whenever a diamond wheel must be retrued.

In most cases, retruing a diamond wheel is not necessary during its life if it is left on the same wheel mount and is not abused or allowed to become extremely glazed or loaded. Fairly frequent dressing or cleaning of the wheel with a silicon carbide (37C40017V) stick will keep the wheel clean and free cutting.

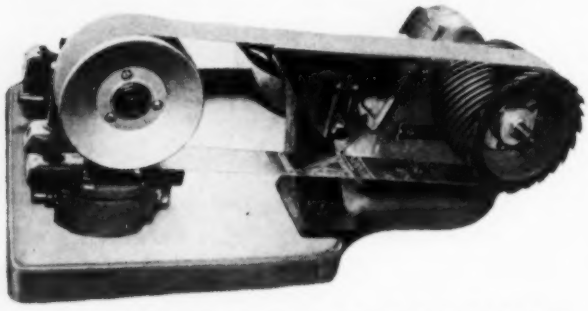
It is imperative not to attempt to get a better RMS finish than the grit size of the wheel is designed to produce. While a dulled or glazed wheel will give a more shiny and lower RMS



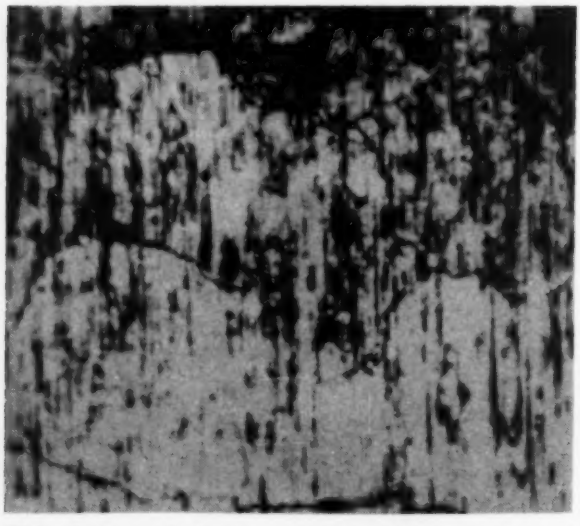
A curved surface is shown being finished with an abrasive belt backed by a resilient contact wheel. Small flats and single curved surfaces are best finished this way. The wheel material is fairly critical as too hard a wheel causes chatter and too soft a wheel results in rounding off the edges of the finished areas.



This is a contact shaft set-up for finishing concave cylindrical areas. The diameter of the contact shaft is determined by the radius of curvature of the part to be finished. It is important to maintain sufficient tension between the belt and the shaft to prevent slippage which causes frictional heat and short belt life. Speeds of about 2000 sfpm are recommended for dry operation, but speeds as low as 400 sfpm have been used satisfactorily with the contact shaft.



A typical belt finishing set-up. The belt is backed-up at the point of cutting either by a flat platen between the wheels and under the belt, or by one of the wheels, or the shaft. The back-up varies in shape and material, depending upon the application. Loose belt finishing has not proved satisfactory for Flame-Plated parts.



This photograph shows a cracked and torn surface of a Flame-Plated coating ground with an aluminum oxide wheel, as magnified 100 times. Even in its most friable form, aluminum oxide is too tough to be used as a grinding medium for Flame-Plated coatings. The cracks in the coating are caused by the heat generated by the dull, tough aluminum oxide grains during grinding, even when the operation is flood cooled.

finish than one in a free-cutting condition, the resulting surface under high magnification will be smeared and possibly heat-checked.

Properly ground flame-plated surfaces, using up to 400 grit wheels, therefore, should not appear glossy or polished. RMS finishes that can be expected from 100 concentration bonded resinoid diamond wheels (either "L" or "N" hardness) are as follows:

100 grit	16-24 micro-inches RMS
220 grit	8-12 micro-inches RMS
400 grit	4-8 micro-inches RMS

Finer RMS finishes can be obtained with standard diamond abrasives and lapping equipment with few exceptions. A cast iron or Meehanite lap has proved to be most desirable.

Two positive requirements for lapping flame-plated surfaces are:

1. Pressures of 15 psi and up; and,
2. Use of a very thin vehicle such as mineral spirits, oleum spirits, paint thinner, etc.

Vehicles with higher film strength and thickness tend to build up a film wedge as thick or even thicker than the size of the diamond abrasive. This results in a hazy or frosty finish because the bort tends to roll or gauge rather than embed itself in the lap and cut evenly.

Following is a chart which gives the approximate RMS finish to be expected when lapping with various-sized diamond abrasives.

Bureau of Standards No.	Diamond Particle Size	Approx. RMS to be expected	Mesh Size Equivalent
1	0-2 microns	1 micro inch	14,000
3	1-5 microns	2 micro inches	8,000
6	408 microns	3-5 micro inches	3,000

Non-Precision Finishing

As-coated flame-plated surfaces are usually in the range of 125-150 micro-inches RMS. This as-coated roughness very readily and inexpensively can be improved to a finish of between 50 and 75 micro-inches RMS.

A soft rubber bonded silicon carbide abrasive has proved to be quite effective. An 80 grit in this type of bond is the most suitable. Finishing time is a matter only of seconds or minutes depending on the area involved.

Silicon carbide sticks (80 to 300 grit, "H" to "L" hardness and vitrified bond) and diamond sticks (80 to 300 grit) have also been successful in polishing flame-plated coatings.

The above operations are essentially done dry if the relative surface speed is such that excessive heats are not built up. All that is required essentially for proper polishing is to provide a suitable relative surface speed between the area to be finished and the abrasive.

The finishing techniques described have been shown to be consistently good, and deviation from these procedures generally results in an unacceptable surface quality.

As a parting statement, it can be said that flame-plated coatings that require finishing are only as good as the techniques employed to work them. • • •

A REPORT

on the superior tailor-made qualities of

G-E MAN-MADE DIAMONDS for METAL BOND WHEELS

A COMPARISON

In the electrolytic grinding of more than 311,000 miscellaneous carbide tools, six metal-bond wheels containing General Electric's latest type MBG Man-Made Diamonds were given a direct comparison to six wheels containing natural diamonds. The result shows a 22.5% superiority of G-E Man-Made Diamonds over natural diamonds.

Diamond Type	No. of Wheels	No. of Tools Ground	Avg. Wheel Wear Inches	Avg. Cu. In. Carbide Removed	Avg. Cu. In. Carbide Removed Per Cu. In. Wheel Wear	Efficiency Ratio
G-E MBG	6	160,713	.0605	90.885	70.2	122.5
Natural	6	150,496	.0644	80.181	57.3	100.0

A CONCLUSION

This comparison between G-E type MBG Man-Made Diamonds and natural diamonds is but one example of the superiority of this crystal developed specifically for metal-bond grinding wheels. The announcement of this new, blocky, tougher crystal, in 80-mesh and finer, with rough surface characteristics, was made by G.E. in April of 1960. In this short time reports reveal that MBG diamonds have shown outstanding results, not only in electrolytic grinding, but in the grinding of sapphire, slicing and dicing of germanium, cutting coarse-grained alumina and carbides.

Your own tests will demonstrate the worthwhile advantages of these new industrial diamonds in your metal-bond grinding operation. Call your grinding wheel supplier today. Metallurgical Products Department of General Electric Company, 11177 East 8 Mile Boulevard, Detroit 32, Michigan.

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

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AmeriCool

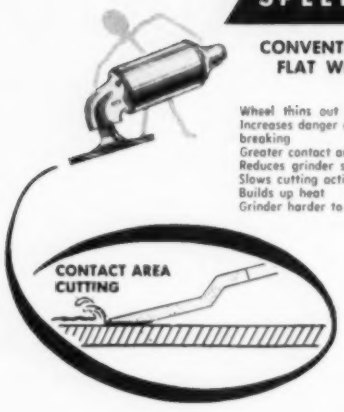
A MIRACLE NEW . . . . . DISHED-DEPRESSED CENTER WHEEL by "American"

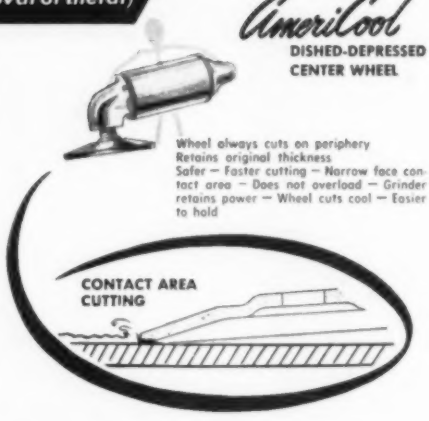
COMPARE THESE FEATURES

Ruggedly reinforced with three full layers of fiberglass permanently resin-bonded and molded to shape. "American's" new Dished-Depressed Center Wheels possess unusual strength and resistance to breakage having nearly a 2:1 safety plus ratio over conventional depressed center wheels. This improved safety factor is made possible by the third full layer of fiberglass fabric, reinforced molded throughout the important bottom side — the most critical area that must withstand the greatest stress while grinding. This unique feature alone will appeal to the safety conscious wheel buyer who demands fast cutting performance along with long wheel life economy.

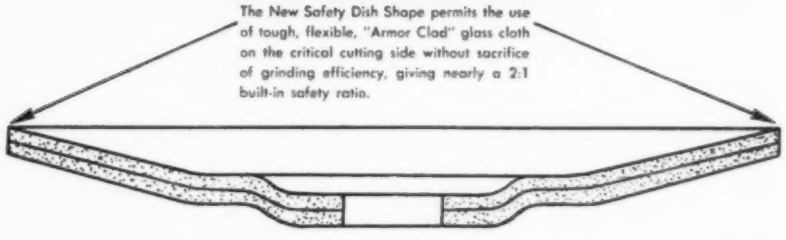
CALL YOUR SUPPLIER OR WRITE

SPEED (fast removal of metal)




WITH NEW AmeriCool DISHED-DEPRESSED CENTER WHEEL
Wheel always cuts on periphery
Retains original thickness
Safer — Faster cutting — Narrow face contact area — Does not overload — Grinder retains power — Wheel cuts cool — Easier to hold
CONTACT AREA CUTTING

SAFETY


The New Safety Dish Shape permits the use of tough, flexible, "Armor Clad" glass cloth on the critical cutting side without sacrifice of grinding efficiency, giving nearly a 2:1 built-in safety ratio.

CONVENTIONAL FLAT WHEEL
CONTACT AREA SMOOTHING AND CLEANING
Generally considered an unsafe practice
Dangerously thins wheel
Kills power — slows operations
WITH NEW IMPROVED AmeriCool DISHED-DEPRESSED CENTER WHEEL
CONTACT AREA SMOOTHING AND CLEANING
Safe operation — wheel thickness is maintained
Narrow contact area — cuts faster. Minimum power loss. Easier operation.

Always use a Guard . . . for purpose of clarity the Guard was not included in these illustrations.

COMFORT

with CONVENTIONAL FLAT WHEEL
30°
awkward — tiring requires added pressure to make cut
WITH NEW AmeriCool DISHED-DEPRESSED CENTER WHEEL
2°-3°
Provides more comfortable performance — easy to use with little pressure required to get cutting action or hold grinder steady.

"American" EMERY WHEEL WORKS

PROVIDENCE 1, RHODE ISLAND

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Literature

Informative reading in abrasive operations for management, engineering, production.

Grinding, Lapping Machines

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Catalog 318 explains the changes in the Taft-Peirce No. 1 precision surface grinder, the 6" rotary grinder, the 24" semi-automatic lapping machine, the 24" rotary lapping machine, and the back spot facing machine. Catalog 318, Taft-Peirce Mfg. Co., 13 Mechanic Avenue, Woonsocket, Rhode Island.

Tool Room Surface Grinders

Use postpaid card. Circle No. 2

Seven sizes in two series of hydraulic feed tool room surface grinders are covered in this 8-page bulletin. Other sizes are available. Bulletin GL-8-60. Gallmeyer & Livingston Co., 400 Straight Ave., S. W., Grand Rapids 2, Michigan.

Diamond Abrasives

Use postpaid card. Circle No. 3

Seventh in a series, the bulletin reviews the latest advances in diamond abrasives. Compares man-made, selected natural, and pressure-tested diamonds. Illustrated. Diamond Tool Research Co., Inc., Wholesale Div., 580 Fifth Ave., New York 36, N.Y.

Surface Roughness Measurement

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The complete line of Profilometer® equipment for shop use in measuring surface roughness is detailed in this 12-page catalog. Photos and sketches supplement the text. Catalog 160. Micrometrical Manufacturing Co., P. O. Box 35, Ann Arbor, Michigan.

Blasting Equipment

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Bulletin No. 227A tells how Pangborn's patented Rotoblast impeller uses controlled centrifugal force for its blast cleaning power. Manufactured in four sizes, the units are described as suitable for most applications. Bulletin 272A. Pangborn Corporation, 780 Pangborn Blvd., Hagerstown, Md.

Raceway Grinder

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A new Landis 4" concentric grinder for grinding bearing races or rings is explained and pictured in a 4-page bulletin. "A new concept of workholding" provides "concentricity within closest limits." Bulletin CX-60, Landis Tool Company, Waynesboro, Pennsylvania.

Thread and Plug Gages

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Cadillac's line of gages is discussed and illustrated in this 36-page catalog. Useful tables of gage tolerances, dimensional constants and related information are included. Cadillac Gages—1960. Cadillac Gage Company, P. O. Box 3806, Detroit 5, Mich.

Automatic Surface Grinders

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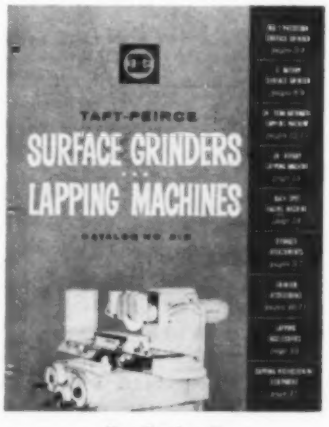
This brochure describes the single-spindle No. 16-A and the two-spindle No. 16-A2 Blanchard automatic surface grinders. The first has a range of 6" O. D. x 3" high; the second 7" O. D. x 4⅜" high on magnetic chuck 8½" x 10½" on plain table. The Blanchard Machine Company, 64 State Street, Cambridge 39, Mass.

Portable Tools

Use postpaid card. Circle No. 9

Every portable air-powered and electric tool made by Buckeye is covered in one of the seven categories in the form's new catalog No. 61. Pages within each category are keyed to the index for easy location. Catalog No. 61. Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio.

continued



(See Number 1)

(See Number 5)

(See Number 9)

FREE LITERATURE continued

Portable Hand Grinder

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A 14-ounce electric portable hand grinder developing up to 25,000 rpm is the subject of this 12-page brochure. Details of the Series 6000 Handee® and its accessories are discussed. Bulletin No. 6066. Chicago Wheel & Mfg. Co., 1101 West Monroe Street, Chicago 7, Illinois.

Plain Cylindrical Grinders

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Landis 10" Type R and 14" Type LR plain cylindrical grinders are the subject of a 6-page bulletin, 10RP-60. Landis Tool Company, Waynesboro, Pennsylvania.

Industrial Diamond Products

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Photographs, diagrams, specifications and pricing information for diamond dressing tools and other diamond products are combined with useful information on diamond applications in this catalog. Catalog No. A-60. Diamond Tool Research, Inc., 380 Second Avenue, New York 10, New York.

Optical Comparator

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Six-page bulletin explains the J & L Model FC-30 ER optical comparator and measuring machine, "the 30" screen comparator with extended range. Form GL-6011. Jones & Lamson Machine Company, 522 Clinton Street, Springfield, Vermont.

Hardness Testers

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Catalog illustrates and describes Rockwell and superficial hardness testers, Tukon microhardness testers, explains the principles involved. Catalog RT-60. Wilson Mechanical Instrument Division, American Chain & Cable Company, Inc., 230 Park Avenue, New York 17, New York.

Annular Form Grinder

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Sheffield's Model 181 Multiform grinder, for grinding annular forms and grooves in parts up to 10" O. D. and 24" between centers, is described. Machine grinds forms up to 4" wide in one operation. The Sheffield Corporation, Box 893, Dayton 1, Ohio.

Man-Made Diamonds

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Success in man-made diamonds for metal-bonded wheels sparked a 12-page brochure up-dating the story of the duplication of natural diamonds. Metallurgical Products Dept., GE, 11177 East 8 Mile Rd., Detroit 32, Mich.

Centerless Grinder

Use postpaid card. Circle No. 17

The Landis 12R centerless grinder, reported as "completely new . . . with extra stability from the floor up . . ." is described and illustrated in a six-page bulletin. Catalog RCNT-60. Landis Tool Company, Waynesboro, Pennsylvania.

(See Number 17)

Precision Lapping

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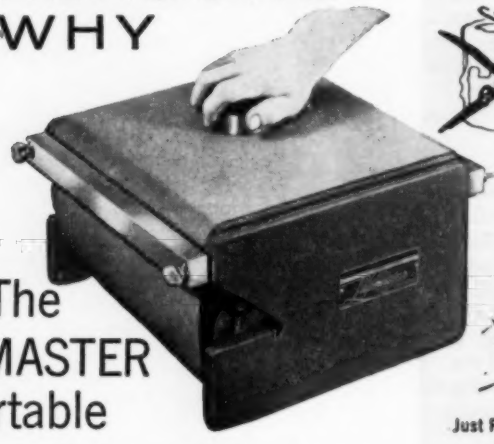
Precision lapping service of The Van Keuren Co. is explained in a catalog sheet punched for three-ring binder. Ranges for tolerance, surface finish and flatness are listed, and examples of work are shown. The Van Keuren Co., 176 Waltham St., Watertown, Massachusetts.

Diamond Wheel Shapes

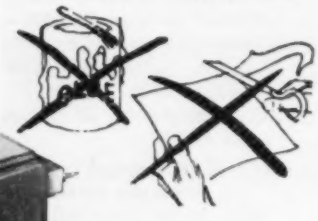
Use postpaid card. Circle No. 19

American Standard Identification Code for Diamond Wheel Shapes (1957) is a revised set of designa-

REASONS WHY



The LAPMASTER Portable Polishing Stand



Makes polishing much easier because it holds polishing paper taut and wrinkle-free . . . *always*. Provides replacement of worn paper with new section . . . *immediately*. Steel stage has been lapped to precision flatness to assure a perfect polishing surface . . . *forever*.

The Lapmaster Polishing Stand is ideally suited for polishing work pieces prior to inspection . . . in the experimental mechanical laboratory...and for small run polishing jobs.

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Crane Packing Co., Ltd., Hamilton, Ont.

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tions for diamond wheel shapes, bringing the symbols up-to-date with all existing shapes and most-used specials. B74.1—1957. Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

Basic Grinding Wheel Data

Use postpaid card. Circle No. 20

A substantial and readable source of information on the use of grinding wheels is Cincinnati's Publication No. PG-320, a colorful 36-page brochure. Remedies for a number of common difficulties are a highlight. Publication No. PG-320. The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Precision Indexing Table

Use postpaid card. Circle No. 21

Twelve-page catalog U-100 shows technical specifications and typical applications for Ultradex® indexing tables. Accuracy claimed to ¼ second of arc. Catalog U-100. AA Gage Co., 350 Fair St., Detroit 20, Mich.

Eye and Face Protection

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Fifty-seven eye and face protection products and accessories are

(See Number 22)

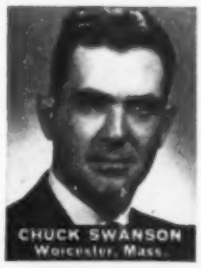
shown in a new 16-page illustrated catalog from Sellstrom. Information on lenses, replacement parts, and goggle cases is included. Sellstrom Manufacturing Co., Palatine, Illinois.

"I'm using an emulsion type grinding fluid. Why?"

know these

DIAMOND SPECIALISTS

RALPH PEEK
Hatboro, Pa.


CHUCK SWANSON
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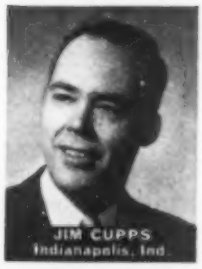
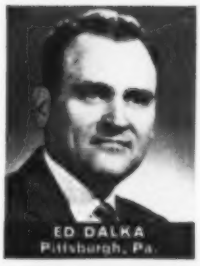
FORRIE SVENDSEN
Rochester, N.Y.


JIM CUPPS
Indianapolis, Ind.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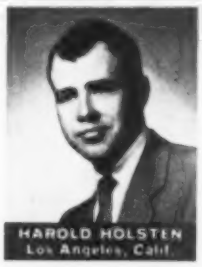
JERRY RICHMOND
Cleveland, Ohio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FREE LITERATURE *continued*

Grinding Workholders

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Six pages of grinding workholders are the most pertinent part of a catalog, "128 Time Savers for Tool Makers." Inspection equipment and tool and workholders for other metalworking operations complete the 64-page publication. Montgomery & Co., Inc., 401 Morris Ave., Springfield, N.J.

Air-Operated Chucks

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An 80-page catalog in color, plastic-bound, describes and illustrates the complete line of Cushman air-operated chucking equipment. Basic information on workholding is included. Catalog No. PO-66-1960. The Cushman Chuck Company, 806 Windsor St., Hartford 2, Connecticut.

Surface Grinder

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An 8-page catalog describes and illustrates the improved Landis Abrasive No. 1½ (10" x 15") precision surface grinder. Catalog 1½-60. Landis Tool Company, Waynesboro, Pa.

Polishing Metal Specimens

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The AB Metal Digest is a compilation of technical information on the preparation of metallographic specimens, including procedures and abrasive materials. AB Metal Digest, Vol. 5, No. 2. Buehler, Ltd., 2120 Greenwood Street, Evanston, Ill.

Safety Eye Wear

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A new selection of eye and face protection is described in a 40-page bulletin. The Sightgard line is said to combine high optical quality with maximum protection and distinctive appearance. Brochure No. 0300-1. Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pennsylvania.

Vertical Spindle Grinders

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Six-page folder is a "round-up" piece on Frauenthal precision grinders. Primarily it discusses the 1800 series grinder and the F-900 standard slide units. Pictures and catalog references for three other grinders are included. Frauenthal Division, The Kaydon Engineering Corporation, Muskegon, Mich.

Vibratory Finishing

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Colorful catalog describes and provides technical information on seven Almco vibratory machines ranging in capacity from ¾ gal. to 17 cu ft. "Before and after" views are shown. Almco, Queen Products Div., King-Seeley Corp., Albert Lea, Minnesota.

Semi-Automatic Plain Grinders

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Condensed specifications and lists of standard and optional equipment are included in the 6-page bulletin on the Landis 6" Type R and 10" Type LR semi-automatic plain cylindrical grinders. Bulletin 6RP-60. Landis Tool Company, Waynesboro, Pennsylvania.

Mounted Wheels

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Brochure tabulates 113 special shape mounted wheels available under SS series ordering method. Immediate delivery from stock. Conversion chart included. Bulletin No. SS-101. American Emery Wheel Works, 1 Richmond Square, Providence, Rhode Island.

Lubricating Oils

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Latest advancements in the lubricating field are explained through detailed charts, photos, and text in an 18-page booklet, "New Dimensions." Form B-144. Bardahl International Corporation, 1400 West 52nd Street, Seattle 7, Washington.

Report from Cincinnati Milling

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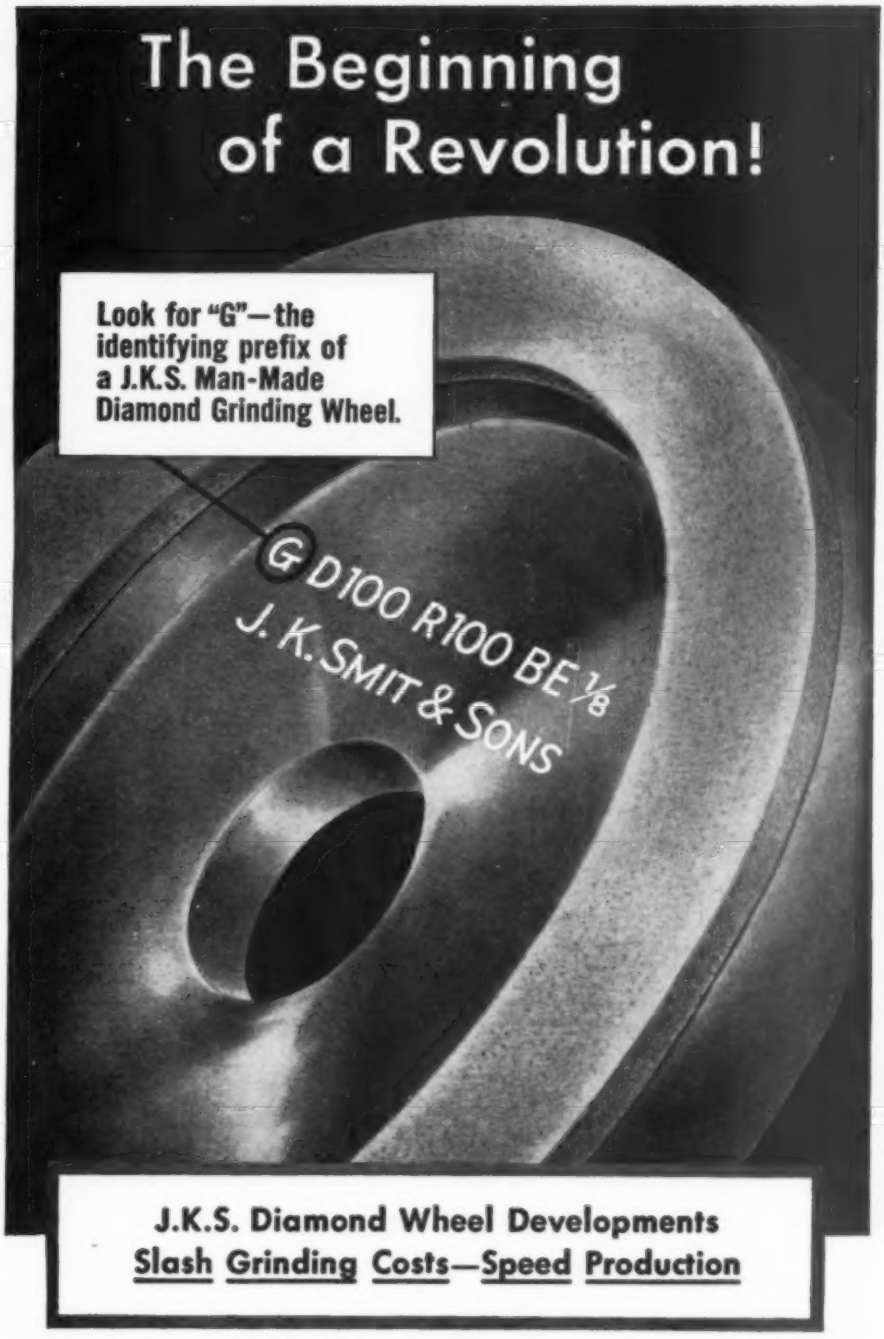
Grinding for cutting production costs and for still closer tolerances is prominent in the current issue, covering the 1960 Machine Tool Exposition. On-the-spot photos help the presentation. Report, Vol. 17, No. 4. The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

CAUTION

JANUARY IS OUR VERIFICATION MONTH

Please be sure to check your January issue wrapper!

The Beginning of a Revolution!



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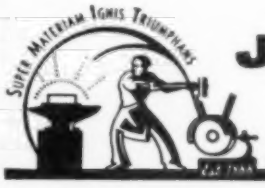

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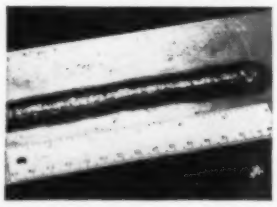
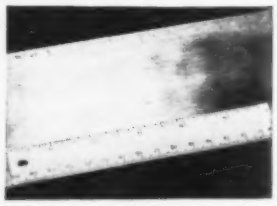


1 Take a rough 6" weld like this. Put a powerful Aro Belt Grinder on the job, and take the grind out of grinding! Full 2 H.P. air motor running at 6000 R.P.M. produces 7000 S.F.P.M. Belt speed—you hog and finish in one operation.



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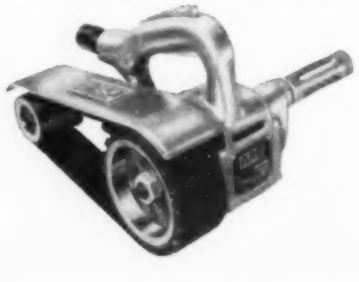

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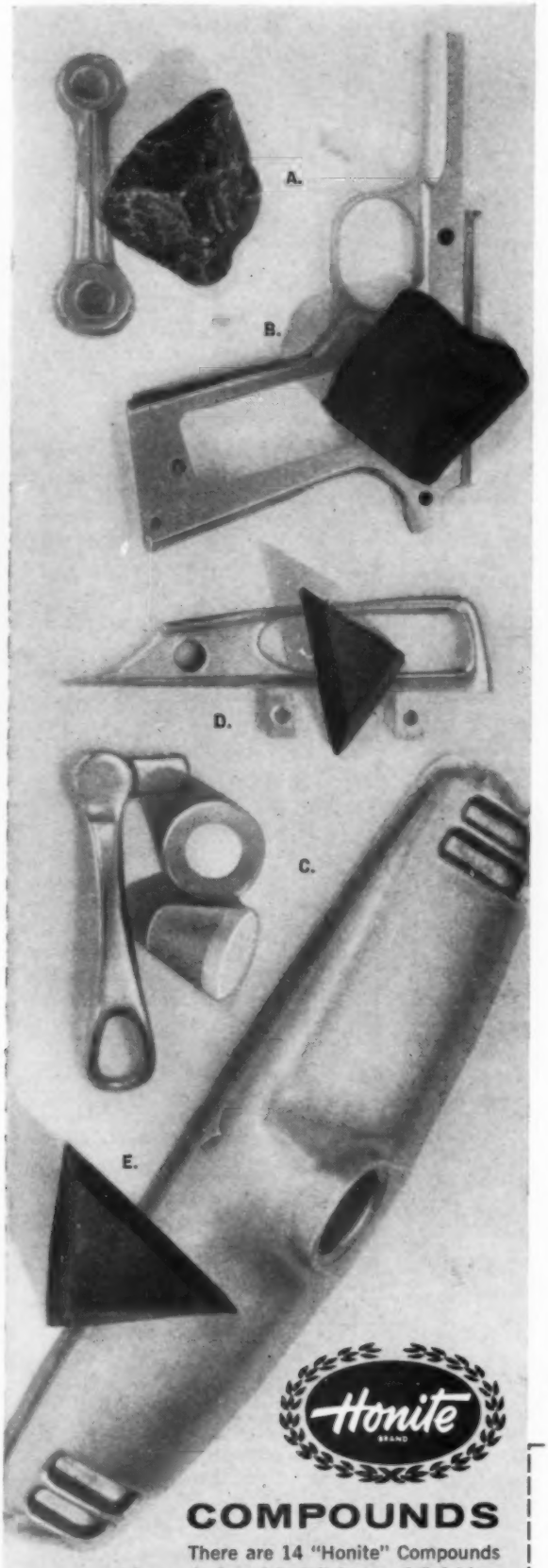

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B. "SUPER-HONITE" – A manufactured chip consisting of a fine-grained, fused aluminum oxide bonded abrasive. Fast cutting and long-wearing – provides a fine, smooth finish on all types of metal. Available in nine sizes. *The hard steel automatic pistol frame was deburred with "Super-Honite" and "Honite" Compound #240; polished with "Super-Honite"and "Honite" Compound #120.*

C. "HONITE" BRAND CERAMICONES – A long-wearing porcelain-type, ceramic medium manufactured in precise cone-shaped dimensions. Ideal for deburring, honing, coloring, or burnishing where lodging is a problem. *The yellow brass handle pictured was deflashed and smoothed with "Ceramicones" and "Honite" Compound #300.*

D. "HONITE" BRAND Z-N TUMBLING SHAPE – A light-weight medium featuring a new bonding material and extremely fine mesh abrasive. Designed to produce fine surfaces on zinc alloys and other metals prior to plating. Often eliminates the need for costly buffing. *The zinc die-cast locker handle pictured was honed and burnished for plating with "Z-N" 3T Tumbling Shape and a newly developed "Honite": Compound.*

E. "HONITE" BRAND C-R TUMBLING SHAPE – A light-weight, fast-cutting medium for use on all metals. Triangular shaped and extremely fracture resistant to prevent lodging. Light weight produces fine, micro-inch finishes without impingement. Available in three sizes. *The aluminum alloy vacuum cleaner head was deburred and prepared for painting with "C-R" 2T Tumbling Shape and "Honite" Compound #240.*

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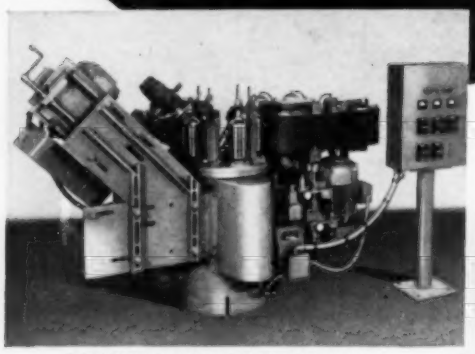
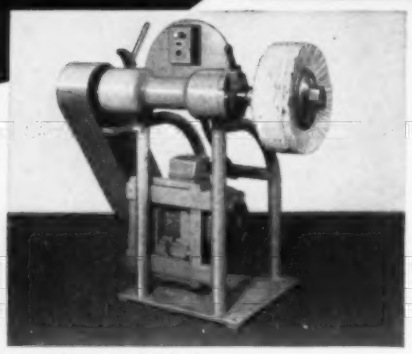
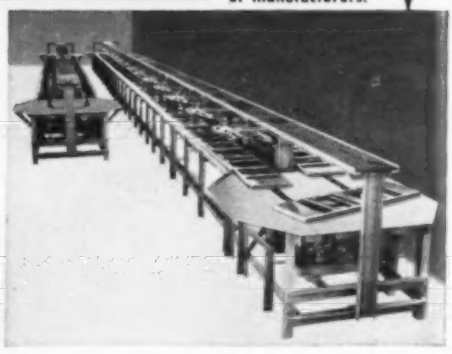
HORIZONTAL-PLATEN CONVEYOR—built to fit your exact requirements—slashes material handling costs for all types of manufacturers.



POLISHING AND BUFFING TABLE—this small dial table has abrasive belt head and buffing head for polishing and buffing spiral aluminum shapes. Available in large and small sizes.



ECONOMICAL LATHE—incorporates all the advantages of more expensive lathes, but is stripped of many unnecessary "frills" to keep costs to a minimum. Capacity from 10 to 20 HP.



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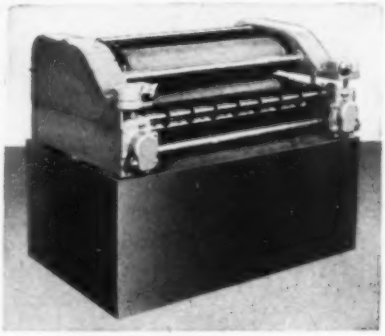

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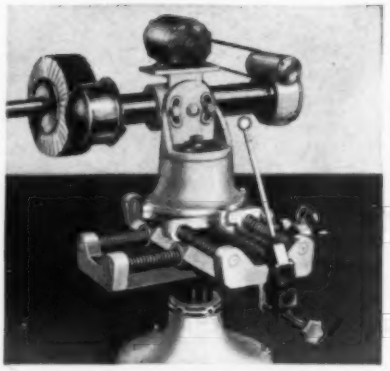
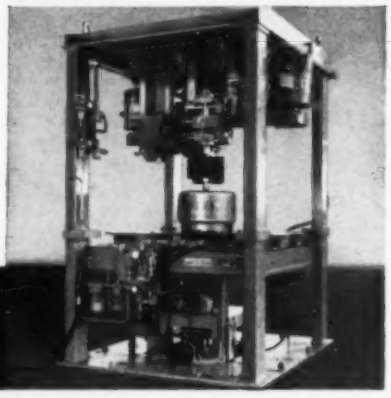


HAN-D-MATIC—one standardized, low cost basic machine with interchangeable components to handle most buffing, grinding, and deburring jobs.



WIRE BRUSH MACHINE—quickly deburrs holes in automatic washer and dryer baskets prior to painting. Part of a completely automated line from load to unload.

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Round-up of Chapter Programs and News

CLEVELAND CHAPTER

"A New Development in Diamond Dressing" was the subject for discussion at the December meeting, held Thursday, the eighth, at the Cleveland Engineering and Scientific Center, 3100 Chester Ave.

Arthur Kohlstrunk, engineering manager, assisted by Donald J. Wallace, vice president of Wheel Trueing Company, Detroit, presented the topic.

Kohlstrunk had a major part in the design, development, and applications of the dressing tool.

Approximately sixty members and guests attended the meeting.

At the chapter's annual meeting in November, George Wassel, Thompson Products Valve Division, Thompson Ramo Woolridge, Inc., was elected president.

Paul R. Wilson of Ford Motor Company's Cleveland Engine Plant No. 2, former secretary, became vice president. Bernard P. Stainbrook of Chevrolet's Cleveland plant was elected secretary. The new treasurer is Therell L. Sipe, New Departure Company, Sandusky, Ohio.

Serving on the Board of Governors are Joseph L. Cognata, former president; Constantine J. Michul; Arthur J. Baehr; Richard E. Joyce; T. Kalassy; Bernard R. Rumienski; and Ladd M. Kabat.

A group of leaders of the Cleveland chapter (l to r): Art Baehr, governor; George Wassel, last year's second vice president, now president; Joe Cognata, ex-president, and governor; Paul Wilson, vice president and former secretary; Dick Joyce and Gus Michul, governors; Ted Sipe, treasurer.

CONNECTICUT CHAPTER

G. H. Burke, sales engineer of The Blanchard Machine Company, Cambridge, Mass., presented a program covering Blanchard surface grinders and their applications in industry at a chapter meeting held November 21, 1960, at Sun Valley Acres, Meriden, Conn.

Fifty members and 34 guests attended the session.

The presentation was made with slides supplemented by a running explanation and commentary. A question-and-answer session completed the discussions.

Dan R. Weedon, assistant manager of Blanchard, introduced the speaker.

Barrel finishing was the general area of exploration for the December meeting, held on the 12th at Plainville, Conn. N. L. Watkins, product manager for barrel finishing, Electro Minerals Division, The Carborundum Company, Niagara Falls, New York, was the speaker.

Slides of parts for ladies' watches being surface ground were shown to illustrate the range of applications of the process.

LONG ISLAND CHAPTER

A four-man panel representing as many types of job-shop grinding made up a unique program for Long Island's November 12 meeting. Held as usual at the Wheatley Hills Tavern, it attracted a group of 55.

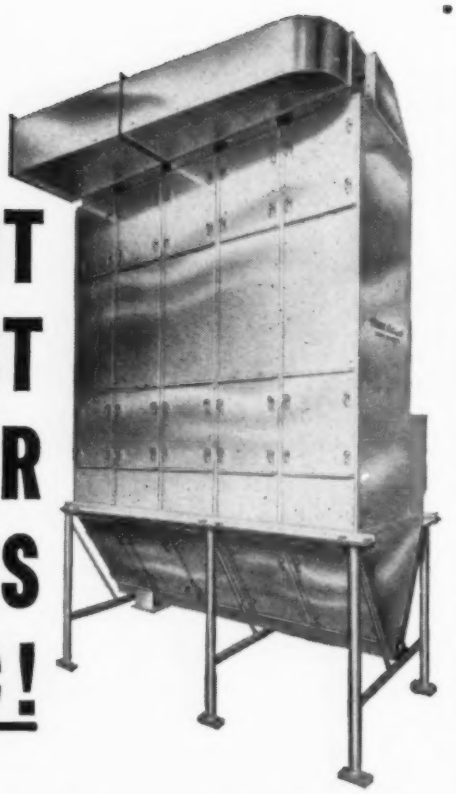
Each speaker was allotted ten minutes to discuss the kind of work handled in his shop, stressing the problems he encountered and his solutions.

The four panelists and their areas for discussion are:

Centerless Grinding . . . Philip Krop
K & K Grinding Co.
Thread Grinding . . . . . K. Soehner
J. Soehner & Sons
Double Disc Grinding . A. K. Allen
Precision Disc Grinding Corp.
Surface Grinding . . . . . J. Goldman
Sal Metal Products Co., Inc.

continued

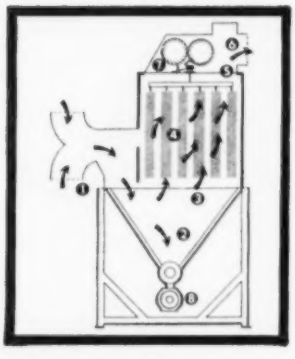
NEW TORIT DUST COLLECTOR IS AUTOMATIC!



Save real dollars with the benefits from this *automatic* dust collector. No more interruptions on production lines! Maintenance problems are practically eliminated. This all new continuously cycling TORIT dust collector *automatically* cleans your air and *automatically* shakes its own filters and blows them clean with reverse air flow. Collected material is emptied *automatically*.

OTHER EXCLUSIVE TORIT BENEFITS

- automatic filter-shaker mechanism is simple, maintenance-free
- different dusts may be collected separately
- highest air-to-cloth ratios (from 5 to 25:1) and longer filter life
- only ¾ H.P. required for fully automatic operation
- polished 3/16" aluminum construction for minimum floor loading
- modular design—5′ wide x 4′-8″ long (for two sections) x 15′-6″ high—saves space, lends ease and versatility to installation. Use up to 12 modular sections for each application! No limit to CFM capacity!



AUTOMATIC AND EFFICIENT, the filtering cycle of each TORIT section is self-timing. A separate blower on the clean air side keeps collector under suction. Then, (1) dust-laden air is taken into manifold; (2) coarse dust drops out; (3) fine dust is carried to filtering sections; (4) filter tubes catch dust on inside surfaces; (5) clean air emerges from filters; (6) to suction fan and clean air discharge outlet. (7) *Automatic* shaking and reverse air filter cleaning mechanism. (8) Conveyor *automatically* removes and discharges accumulated dust.

Have a cleaner plant, better morale and high productivity with lowest maintenance costs. Special design services are available based on your individual requirements. Write today for literature.

TORIT MANUFACTURING COMPANY

Automatic Collector Division, 1133 Rankin St., St. Paul 16, Minn., Dept. 534

Use postpaid card. Circle No. 234

ASA News

NEW JERSEY CHAPTER

V. R. Bull, district sales manager, Machine Division, Gardner Machine Company, Beloit, Wisconsin, showed a 30-minute film and spoke briefly on the subject of disc grinding at the November meeting.

Twenty-five attended the meeting, held November 16 at For Hills Restaurant, Bloomfield, New Jersey.

Applications discussed and illustrated in the presentation emphasized size control and automatic dressing in mass production.

The chapter's Christmas party was held December 9, at the Blue Shutter Inn.

SAGINAW VALLEY CHAPTER

Donald J. Wallace, vice president of manufacturing, Wheel Trueing Company, Detroit, spoke to some 42 members and guests of the Saginaw Valley chapter during their late October meeting at Naismyth's Restaurant, near Saginaw, Michigan.

Wallace emphasized the types sources, shapes, and sizes of diamonds and the various types of tools in which they are used. To illustrate the material he used slides, actual diamonds, and various types of diamond tools.

R. E. Whiteside, accident prevention manager for Employers Mutual of Wausau, discussing wheel safety at Chicago chapter's November meeting.

HUDSON-MOHAWK CHAPTER

The chapter's November meeting was devoted to a review of the past year, planning for the 1961 season, and the election of officers.

Charles E. Bennett, the chapter's only charter member, was elected president. Robert H. Wilcox moved over from secretary to vice president, with Frank L. Tybush replacing him as secretary. Otto Gunther continued as treasurer.

Eighteen members attended the session which was held at the Cross-Roads Inn, Lathams, New York.

• • •

Ideas from the Shop

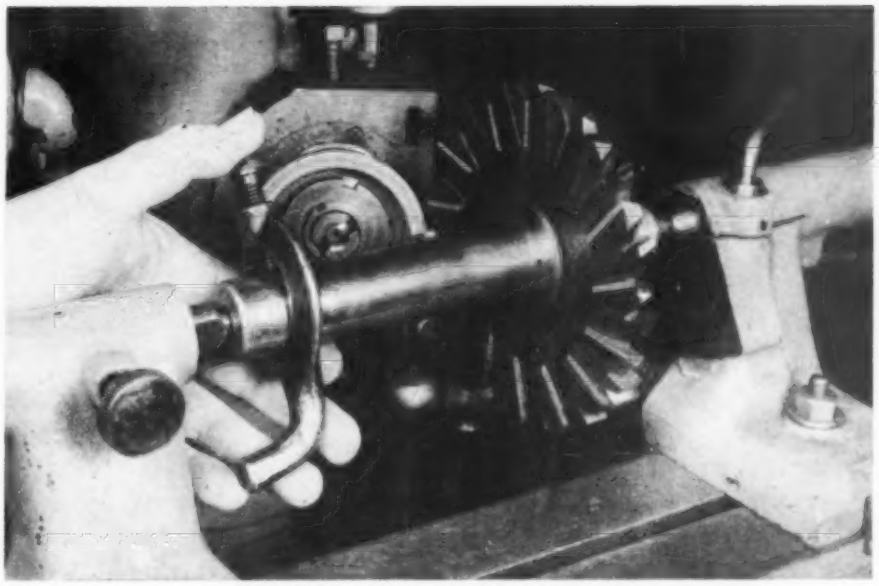
LATHE DOG PROVIDES SAFE HAND-HOLD ON CUTTER GRINDER

By H. J. Gerber

• The common method for holding helical milling cutters against a tooth rest is to grasp the cutter itself with the bare hand.

This practice is somewhat hazardous and operators have often received severe cuts from the sharp cutting edges, particularly if the cutter has accidentally slipped off the tooth rest and jammed into the wheel.

A simple remedy is to place a lathe dog on one end of the cutter mandrel and use this as a handle to rotate the cutter against the tooth rest.



Lathe dog mounted as holding device on helical milling cutter.

GRINDING BOWED SHEET

By Augustine P. Moran

• A thin piece of rubber, placed on the magnetic chuck under a bowed or twisted piece of thin sheet steel to be ground, will help to secure a flat surface for grinding. For best results, the rubber sheet should be approximately .20" to .030" thick.

During the grinding operation, the ends of the sheet are sufficiently imbedded in the rubber to compensate for the bowing or twisting.

Send YOUR Idea to:

Ideas Editor
GRINDING and FINISHING
Hitchcock Publishing Co.
Wheaton, Illinois

. . . and we'll send you a TEN-SPOT for each one we use.

COMMON CAUSES OF PRECISION GRINDING FAULTS

Out-Of-Round Work, General

1. The heat of the cut can result in distortion of parts with thin or unequal cross sections.
2. Interrupted cuts over key ways, oil grooves, valve ports, etc.
3. Out of balance work.
4. Distortion of part through improper clamping in chucks and fixtures.
5. Wheel too hard or too fine.
6. Not enough tarry when work has reached size.
7. Insufficient cutting fluid into the cut and over the part.
8. Lack of rigidity in machine elements or fixtures.

Out-Of-Round, Centertype

1. Refer to all general items.
2. Egg shaped center holes in workpieces.

Out-Of-Round, Centerless

1. Refer to all general items.
2. Regulating wheel speed too slow.
3. Workpiece not high enough above center.
4. Blade angle not steep enough.
5. Loose or worn regulating wheel bearings.
6. Worn out drive chain or sprockets on regulating wheel drive (model OM and earlier).
7. Not enough stock to round up.
8. Regulating wheel loose on collet.

continued

You always finish ahead with
STAR DUST DIAMOND WHEELS

Whatever your job requirements... precision grinding, cutting or finishing, there's a Star Dust Diamond Wheel to help you reduce costs for time and materials. Star Dust Diamond Wheels cut freer and faster because of newly improved bonding techniques and rigid quality control in selection and grading of diamonds, both natural and man made.

Get all the facts on Ace Abrasive Laboratories' line of resinoid and metal bond Star Dust Diamond Wheels and Diamond Abrasive Products. Write or call for free catalog "F" today.

ACE ABRASIVE LABORATORIES, Inc.
Ploneer 6-3347
35 Roselle St.,
Mineola, L.I., N.Y.

Use postpaid card. Circle No. 273

Ideas from the Shop

Out-Of-Round, Internal Grinders

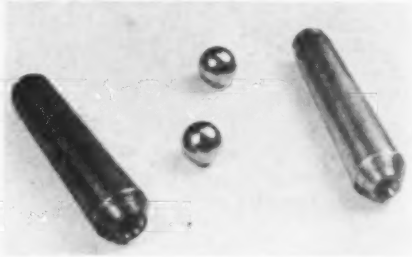
1. Refer to all general items.
2. Workpiece may be distorted in clamping. This may be checked by indicating the ground hole before and after releasing clamps.
3. In the case of bell-mouth holes the wheel may have overtraveled the hole too far. Also check alignments of workhead, wheel spindle, and diamond truing line.

(Adapted from material published by Cincinnati Milling Products Division, Cincinnati Milling and Grinding Machines, Inc., and used by permission.)

BALL CENTERS FOR WHEEL BALANCING

By H. J. Gerber

• If you don't have a set of balancing ways you can adapt an engine lathe for precision checking balance of your grinding wheels.

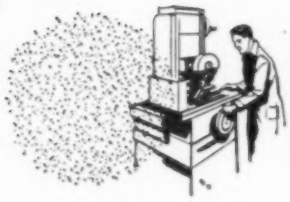


The wheel arbor is seated on a pair of steel bearing balls placed in special cup centers held in the head and tail spindles of the lathe.

We modified two discarded soft steel centers by flattening the ends and boring a 60 degree seat, or cup, to hold the ball.

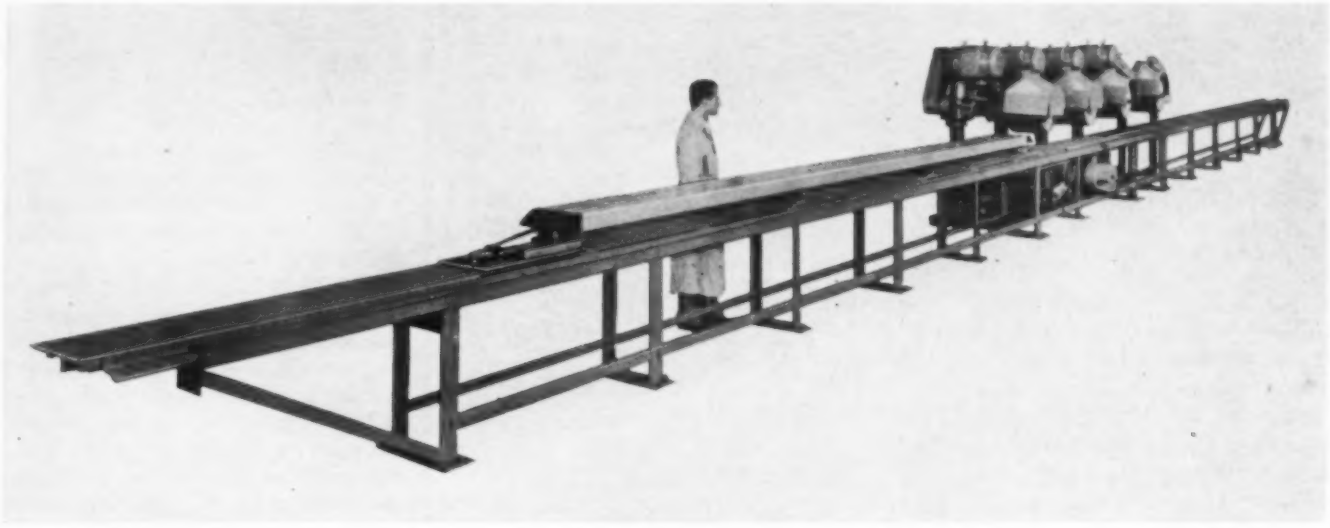
Mounting the arbor on these hardened and polished steel balls permits the almost friction-free contact which is so necessary for a precision balancing job. • • •

"O. K. Let's have your idea on grinder work rests."



Equipment and Materials

MACHINE PROVIDES AUTOMATIC RECIPROCATING LINE BUFFING



An automatic reciprocating straight line buffing machine has been designed for finishing surfaces of long extrusions.

The machine, illustrated above, consists of a series of Acme fully adjustable buffing lathes and a conveyor on which a reciprocating workholding platen is mounted.

Generally the length of the conveyor is twice the length of the workholding platen plus required lathe space. This length can be reduced about 20% by a special drive arrangement.

Platen speed can be varied with a 3-to-1 variable speed drive having a normal range of 15′ to 45′ per minute.

The extrusion buffing machine illustrated is 58′ long, with four Acme G-4 fully adjustable heavy duty lathes. Each lathe is powered by a 25 hp motor.

Acme Manufacturing Company, 1400 East Nine Mile Road, Detroit 20, Michigan.

Use postpaid card. Circle No. 40

CLEANING STICK IMPROVES DIAMOND MANDREL CUTTING

A cleaning stick for diamond mounted mandrels improves cutting action and brings about superior finish on the work, according to the manufacturer, Precision Diamond Tool Company.

The stick is recommended for resinoid and single layer diamond mandrels. Molded like a conventional grinding wheel dresser, it is different in being resilient enough not to injure even the most delicate diamond mounted mandrel.

Cleaning sticks are impregnated with aggressive compounds that remove the products of grinding, regardless of the material being ground.

A working sample, individually packaged in an attractive box, is available on request. Please request sample on Reader Service Card.

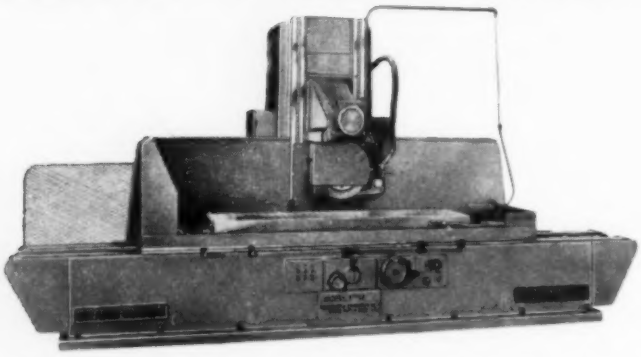
Precision Diamond Tool Company, P.O. Box 274, Elgin, Illinois.

Use postpaid card. Circle No. 41

continued

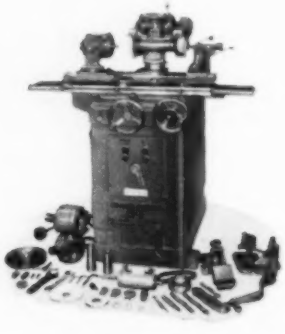
FOR

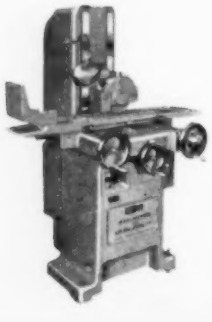
MAXIMUM PRECISION IN TOOLROOM OR PRODUCTION GRINDING



MODEL F HYDRAULIC FEED SURFACE GRINDER a production type with cross sliding head, built in sizes ranging from 12" x 18" x 48" to 30" x 25" x 120". Heavy, powerful grinder with maximum table speed of 150' per minute. Motor mounted directly on grinding wheel spindle to assure full power is transmitted directly to wheel. Automatic feeds in increments from .0001" to .001" per reversal available.

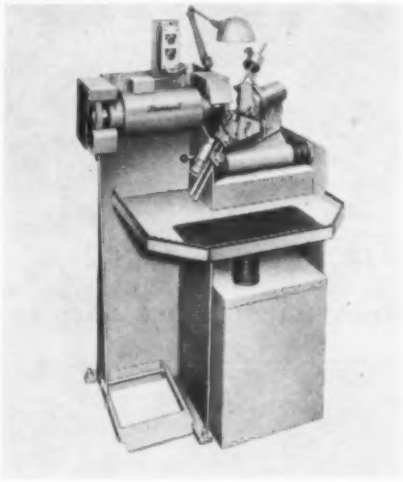
NO. 10 UNIVERSAL CUTTER AND TOOL GRINDER built to meet the need for a high grade machine of medium capacity at a moderate price. Combines rigidity with maximum convenience of operation. Head swivels 360°, locks in any setting; table swivels 90°. Hand operated longitudinal movement. Two spindle speeds.





NO. 20 HAND FEED SURFACE GRINDER has hand wheels for vertical and longitudinal table movement to assure toolroom precision and exceptionally fine finish. One-piece column and base, greased-for-life ball bearing spindle. Available with portable, motor driven coolant system.

DRILL GRINDER FEATURES FAST SET-UP



Set-up changes in seconds are a major feature of a new Model DG-1 multi-point drill grinder, according to Hammond Machinery Builders, the manufacturer.

This Model DG-1 incorporates the principle of conical grinding and grinds both general purpose and special points common with today's numerous super-alloy metals.

The wide variety of points which the unit is capable of producing is obtained by simple and rapid adjustments of the ⅛" to 1" drill holder furnished as standard.

This holder of advanced design can be swiveled in seconds to any point angle between 60 and 180 degrees, and set for minimum, maximum, or normal relief angles. There is a quickly adjustable stop for limiting the holder swing for three and four lip drills.

The holder mounting can be swiftly moved with a hand-wheel in order to make use of the wheel corner for step, sub-land, split point, and modified split point drills.

Hammond Machinery Builders, Inc., 1651 Douglas Avenue, Kalamazoo, Michigan.

Use postpaid card. Circle No. 42

GRAND RAPIDS G

AUTOMATIC DUST COLLECTOR MODULAR, SELF-CLEANING

Modular design and self-cleaning action are key characteristics of a new line of Torit automatic dust collectors.

The equipment operates without interruption in continuous collecting and cleaning cycles. Modular sections permit adaptation to varied dust collection and space requirements.

Eleven models of the Automatic are offered, ranging from 2 to 12 sections. Each model is 5′ deep and 15′ 6″ high. Width varies from 4′ 8″ to 21′ 10″ depending on the number of sections. Units are shipped knocked down, for assembly on the job site.

Up to 58,000 cfm of air can be handled through a single 12-section model.

Torit Manufacturing Co., Automatic Collector Division, 1131 Rankin Street, St. Paul 16, Minn.

Use postpaid card. Circle No. 43

HEAVY-DUTY X-RAY PRODUCES SHARP IMAGES

A new heavy-duty industrial X-ray machine from Picker X-Ray machine produces images of "unmatched sharpness" for testing and inspection.

The unit is designed for use in aircraft and other industries requiring large amounts of non-destructive inspection.

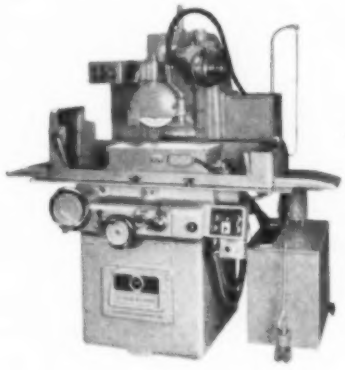
Its counter-weighted three-inch-square mast is reported to eliminate

continued

YOU

CAN FIND THE RIGHT MACHINE FOR YOUR NEEDS ON THESE PAGES

NO. 60 UNIVERSAL CUTTER AND TOOL GRINDER offers precision sharpening, fast set-ups and low maintenance. Designed for maximum convenience of operation, with work weight carried directly over base, permitting operator to stand close to work. Master hand wheel provides three speeds of longitudinal table travel.



NO. 360 HYDRAULIC FEED SURFACE GRINDER. A precision toolroom type which offers absolute accuracy with micro-inch finish at production speeds. One-piece column and base, infinite longitudinal table speeds from 3″ to 120′ per minute, variable speed cross feed. Available with new incrematic downfeed with automatic spark-out after pre-set stock removal.

NO. 1230 HYDRAULIC FEED O.D. & I.D. GRINDER meets the needs of users requiring a machine that does both internal and cylindrical grinding. It is a rugged, precision tool capable of taking rough cuts as well as producing the finest finish. Has a host of controls and adjustments for maximum convenience and versatility of operation.

A note on your letterhead will bring full details. Please specify the type of grinder you are most interested in.

GALLMEYER & LIVINGSTON CO., 416 Straight Ave., S.W., Grand Rapids, Mich.

GRINDERS

GALLMEYER & LIVINGSTON

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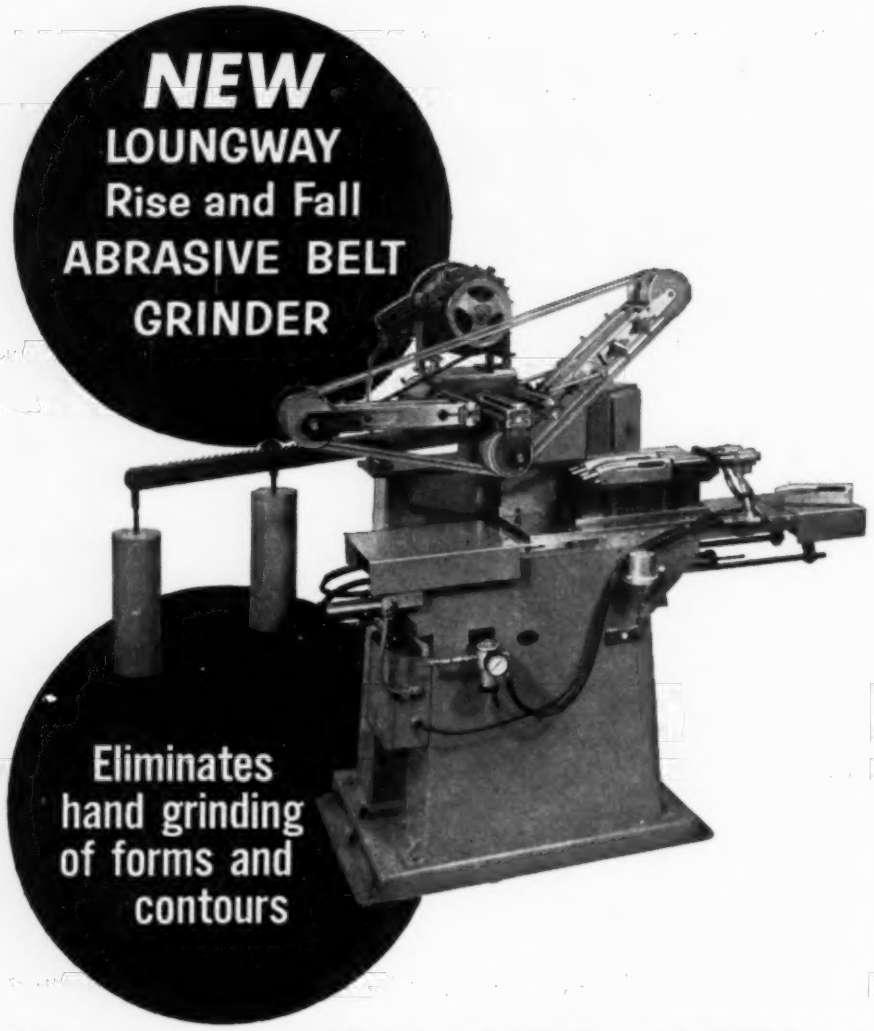
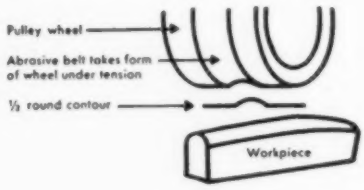


Now you can increase your production of small parts that formerly could only be ground by hand. Automatic grinding with the new LOUNGWAY Rise & Fall Abrasive Belt Grinder also multiplies output by reducing rejects, as well as improving product quality.

Grinding pressure, stock removal, finish and uniformity over long production runs can be accurately controlled by adjustable counterweights and rise and fall cams.

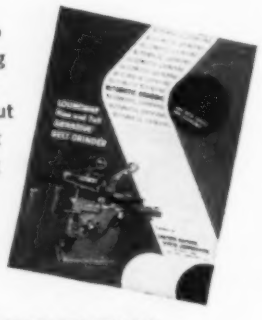
To fair regular or irregular fillets, a scalloped edge abrasive belt may be used. Or, for intermittent ground surfaces, a series of narrow or varying width abrasive belts do the operations.



12 GAGE SHOTGUN RECEIVER

A concaved lower pulley wheel forms the abrasive belt to grind the radius on the top of receiver. Automatic grinding preserves the tolerance required and produces an even surface not possible by hand grinding methods. A two-spindle LOUNGWAY Grinder rough and finish grinds flat sides on receiver.

We invite you to write for Catalog No. 100 now to learn more about this unique cost and time-saving LOUNGWAY Grinder.



EASTERN MACHINE SCREW CORPORATION

61 Barclay Street • New Haven 6, Connecticut • STate 7-5724

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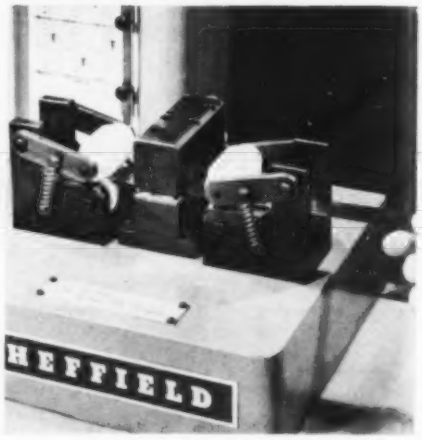
vibration and assure clear images. The mast can be pivoted through 360° and fits under an 8′ ceiling. The unit also has a telescoping tube arm that provides 16″ cross travel.

Picker X-Ray Corporation, 25 South Broadway, White Plains, N.Y.

Use postpaid card. Circle No. 44

GAGE PROVIDES CONSTANT CHECK OF THIN STOCK



Continuous inspection of the thickness of thin strips of metal or other hard material within a total tolerance range of two ten-thousandths of an inch (.0002″) is being performed with the new Precisionaire® non-contact air gage shown above.

The standard model instrument accommodates strips up to one inch wide ranging in thickness from .0027″ to .062″ by means of interchangeable riser blocks. Models to check other thicknesses and widths can be supplied.

Thickness is checked at three points across the width of the strip.

The new inspection instrument consists of a compact bench-type air gage fixture connected to a three-column Precisionaire instrument.

To use the instrument, the operator pulls the strip through the non-contact air gage head which has three pairs of opposed airjets.

Each pair of opposed airjets is connected to its own column in the Precisionaire instrument. With gaging amplification of 10,000 to 1, the float rises or falls a total of two inches in the two "tenths" tolerance, instantly revealing any thickness deviation.

The Sheffield Corporation, Box 893, Dayton 1, Ohio.

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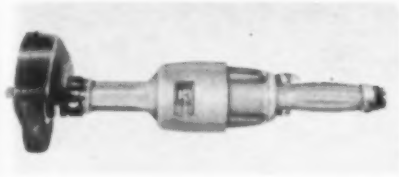
STEP UP POWER ON HEAVY-DUTY GRINDERS



The recently-introduced 74G series of heavy-duty portable grinders are reported to have a 75% increase in power and a reduction in noise level over previous models.

Maximum capacity of the series is 8" organic wheel or 6" wire brush at 4500 rpm. Ratings include 4" wheel at 9000 rpm, 5" at 7200 rpm, and 6" at 6000 rpm, with speeds under load maintained by a highly sensitive governor. Maximum weight is 10-7/16 lbs., while maximum length is 19¼".

Straight handle models have either an on-off thumb flip throttle or a safety lever throttle. Grip handle models are also available with a safety throttle. All models have an improved hex grip on the front end for easier tool control. Stationary wheel guard, spindle washers, and nut to match wheel diameter are standard equipment.

Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio.

Use postpaid card. Circle No. 46

SMALL VIBRATOR PLANNED FOR DELICATE PARTS

Lorco's new Model 610 is a small bench model vibration finishing machine.

Capacity of the new unit is ¼ cu ft; over-all width, 12"; length, 34"; height, 28". Its load capacity is approximately 35 lbs of parts and media. Speed is variable from 700 to 3500 vibrations per minute (vpm).

Imparting the same vibratory action as larger models, the unit is

continued

OLSON FILTRATION ENGINEERS *Cincinnati 12, Ohio*

OL-17-G

Send complete information on the new Olson "package" coolant filter.

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*Firm Name*_____

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Only from Olson . . .

"PACKAGE" COOLANT FILTERS FOR INDIVIDUAL MACHINES

Now you can lower your cost-per-part even on individual machines performing specialized operations. With the new Olson "package" filter, equipment such as honing machines, small precision grinders and spark disintegrators can be supplied a continuous flow of uniform, visually clean coolant. This makes it possible to produce low micro-inch finishes at the lowest possible cost.

Olson's compact, highly efficient "package" coolant filter can be installed quickly and easily on existing machines, and will guarantee you years of economical, trouble-free operation. For complete information, mail the coupon today.

Use postpaid card. Circle No. 237

expected to be used for finishing jewelry and other small parts. It can also be used for experimental finishing of a few samples of larger parts.

Lord Chemical Corporation, 2068 South Queen Street, York, Pennsylvania.

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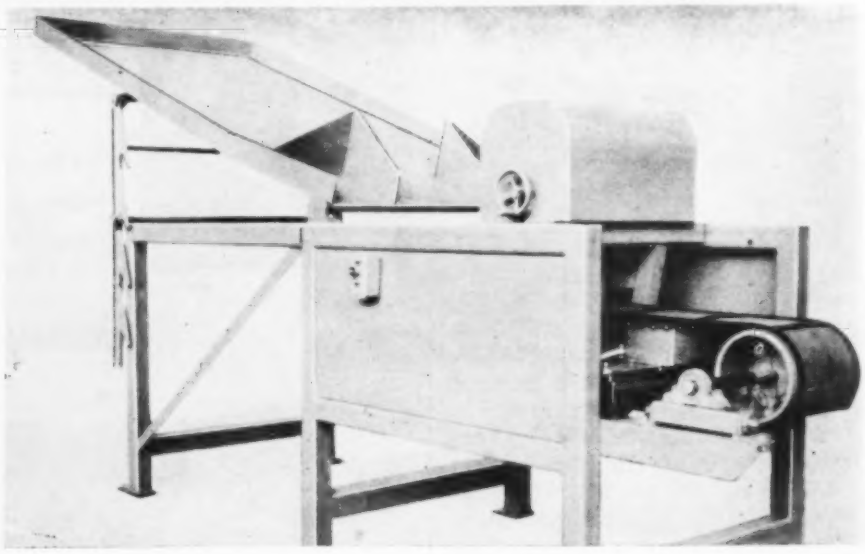
Use the Reader Service Card— or say you saw it in GRINDING and FINISHING

MAGNETIC SEPARATOR REMOVES PARTS FROM MEDIA



High-speed mechanical separation of ferrous parts from finishing media is reported for the Rampe magnetic parts separating machine. This entirely eliminates hand-picking or screening.

Separation is accomplished by a permanent drum-type magnet which pulls the parts up and out of the media mixture, depositing the parts on a moving conveyor belt for demagnetizing and delivery.

Two types are available. One is a completely integrated, hopper-loaded magnetic separator. The other is an attachable unit for use with existing screen separators.

The complete Model MS-12U has a feed chute capacity of 12 cu ft, belt speed of 70 to 124 fpm, and belt width of 9" or 12". The machine is 130" long, 50" high, 37½" wide.

Rampe Manufacturing Company, 14915 Woodworth Avenue, Cleveland 10, Ohio.

Use postpaid card. Circle No. 48

COMPOUND STOPS RUST BETWEEN OPERATIONS

A series of water-displacing rust preventatives is said to stop rusting between operations in metalworking and finishing shops. They are especially applicable after deburring, barrel cleaning and burnishing.

When the wet work is immersed in the proper Patclin preventative, the water is displaced and a film is deposited on the work.

Three grades are being marketed. Patclin No. 404 leaves a light monomolecular film; No. 430, a soft, nondrying film; and No. 431, a hard, waxy film. All three grades are sold in 55-gallon non-returnable drums.

Patclin Chemical Company, Inc., 11-23 St. Casimir Avenue, Yonkers, New York.

Use postpaid card. Circle No. 49

Cut Rising Costs *NOW*

with

BRIGHTBOY

***Reduce* BURRING • CLEANING • FINISHING • POLISHING**

to one operation!

Multi-use Brightboy will frequently do this for you, *and improve your product quality!*

A NEW APPROACH
TO BIGGER TIME SAVINGS
THE REVOLUTIONARY CONCEPT
OF ABRASIVE APPLICATIONS

for working all metals, wood, glass, laminated materials, some plastics

You must see Brightboy's unique, simultaneous, rubber-and-abrasive working action to believe it. You must see how easy it is to select exactly the right JOB-MATCHED wheels, sticks, rods and blocks for automation, machine and manual operations.

READILY AVAILABLE STOCK TEXTURES

Extra fine to extra coarse in soft, semi-firm, firm and tough rubber binders. Revolutionary Brightboy, the only complete, comprehensive stock line of soft rubber bonded abrasives, is saving money today for countless users. Investigate NOW!

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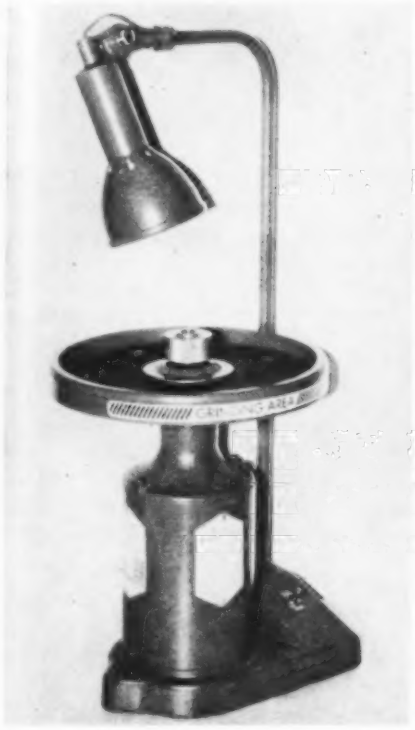
BENCH GRINDER USES STROBE PRINCIPLE



A. P. de Sanno's "Stroboscope" can best be described as a bench grinder turned on end. Holes in the metal-backed organic-bonded grinding wheel permit the operator to look through and see the work being ground below.

Grinding on the side of the wheel rather than the periphery assists in the generation of flat surfaces, and the holes do not cause any difficulties. The holes are large enough and so spaced that practically the whole side area is visible as the wheel revolves.

With the left-hand part of the wheel designated as the grinding area (facing the grinder), and with the wheel revolving in a clockwise direction, the grinding surface of the wheel is always moving away from the operator.

The metal backing or the top side of the wheel gives a measure of safety to the operator, and a metal guard around the periphery is further protection. The unit complies with applicable provision of the ASA safety code.

Each grinder comes equipped with an 8" x ½" x ½" 60 grit metal-backed organic bonded general purpose grinding wheel and a 120 grit polishing wheel. Similar wheels in various grit sizes and abrasive types can be furnished for all types of grinding.

A. P. de Sanno & Son, Inc., Wheatland St., Phoenixville, Pa.

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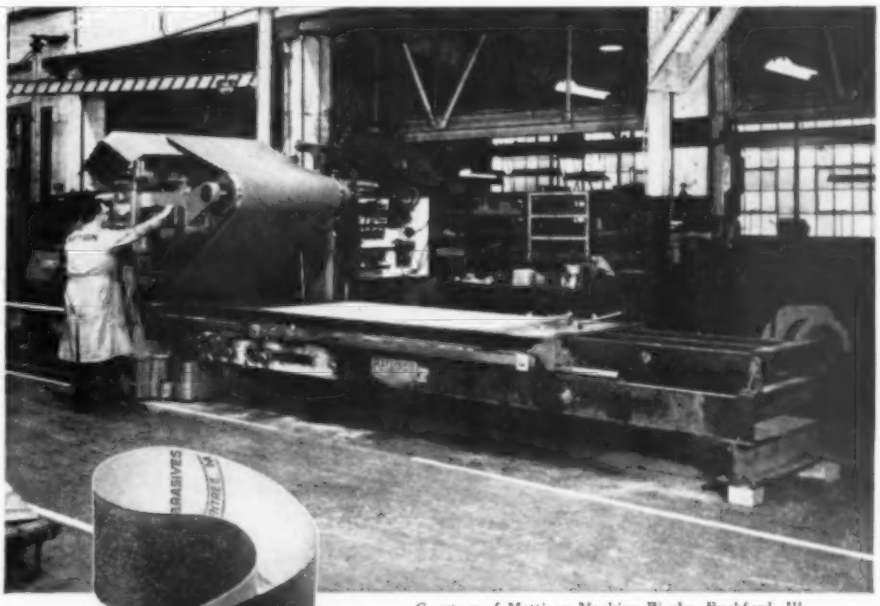
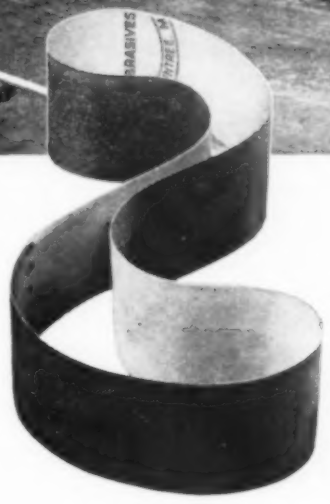
for a better finish
and lower grinding cost,
specify Jewel Brand
abrasive belts



Courtesy of Mattison Machine Works, Rockford, Ill.



The Mattison No. 455 Wide-Belt Grinding and Polishing machine utilizes factory coated abrasive belts. It is designed to grind Stainless Steel and alloy sheets.

Today's modern machines are highly developed to produce at highest production speeds with uniform results and minimum costs. But one thing they can't do — they can't choose the right abrasive belt. That's why men who know metalworking specify Jewel Brand. They know, from experience, that Jewel Brand Abrasive Belts are built right to do the job — and do it well.

Why don't you specify Jewel Brand? You'll be assured of getting the right bond, the right backing, the right grain.

For a trial run, call your industrial distributor or write: Abrasive Products, Inc., South Braintree 85, Massachusetts.

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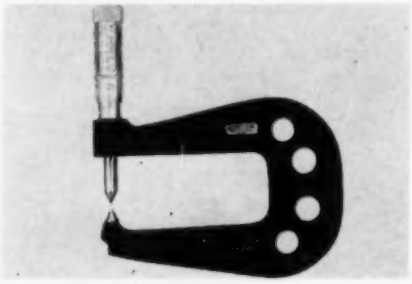
UTLITY MIKE MEASURES COMPOUND CURVATURES



A new utility micrometer has been designed for accurate and quick measurement of compound curvatures on airfoil surfaces.

The use of a conventional micrometer with a flat anvil and a flat spindle could result in errors. The curved surface did not always make full contact with the anvil.

Slocomb's utility micrometer has an anvil and a spindle comprised of small diameter pointed terminals which permit accurate measurement of curved surfaces.

The micrometer has a measuring capacity of 0 to 1" and a 3" deep-throated frame. Hence, it can measure 3" in from the edge of an airfoil section.

Because of its design it can be used for measuring many irregular surfaces which could not previously be accurately gaged.

J. T. Slocomb Co., 68 Matson Hill Road, South Glastonbury, Connecticut.

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SPITFIRE
1 2 3 basic reasons Lapping is now a standard
Illustrated: the Spitfire 36" Pneumatic Lift Flat Lapping Machine
1. PROVED: Spitfire Lapping Machines have been in continuous operation for approximately two decades in almost every phase of industry... built-in quality and precision, experienced engineering assure demanded reliability.
2. NEED: Quality control requirements for lapping to thousandths of an inch precision has become increasingly necessary. Literally any piece part produced of any material is quickly, accurately, economically lapped and/or finished in small or high volume production with Spitfire machines.
3. COMPLETE LINE: from small bench type 6" roller lapping machines to 48" pneumatic flat lapping machines.
Write for free Spitfire Catalog.
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Chicago 41, Illinois
Phone: AVenue 6-1610

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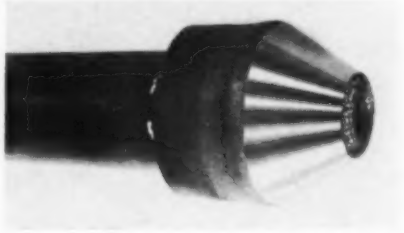
HARDFACING ADDS LIFE FOR GRINDER CENTERS



Sprayed-on tungsten carbide hard-facing on grinder centers has lengthened the period between regrinds from one day to an average of 55 operating days, according to a report from Oliver Corporation, Cleveland.

Life of the .060" thick hardfacing is estimated at 100,000 or more pieces with ten regrinds, based on 17 months of service with two regrinds. Each regrind has removed between .0025" and .005".

The hardfacing, known as Kenspray, is applied by standard metal-spraying techniques modified for use with tungsten carbide powders by Kennametal Inc.

Kennametal, Inc., Lloyd Avenue, Latrobe, Pennsylvania.

Use postpaid card. Circle No. 52

NEW BARREL COMPOUNDS GIVE BETTER FINISHES

Three new barrel finishing compounds from Almco have shown superior results, according to the manufacturer.

Compound No. 101 is a highly concentrated powder specifically formulated to burnish aluminum, zinc, stainless steel, and other metals. On die-cast parts, in many cases, it has produced results that equal or surpass hand-buffed finishes.

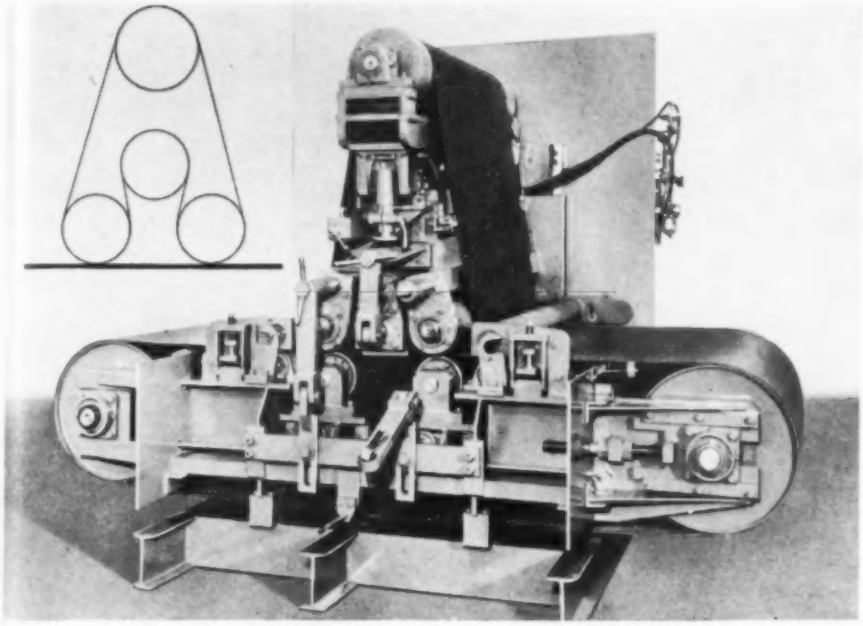
Compound No. 101A is a cleaning and burnishing liquid for metal cleaning, burnishing, and light degreasing operation, recommended for use in spindle machines, submerged barrels, and vibratory finishing machines.

Compound No. 403 is a long-lasting, neutral abrasive compound which can be used with any type of media for cut-down of both ferrous and non-ferrous metals. An economical, closely-screened, aluminum-oxide base compound, it contains grease and oil emulsifiers, water softeners, rust inhibitors, and abrasive materials. It can be used in self tumbling as well as with all types of barrel finishing media to generate radii, improve micro-inch finishes and deburr.

Almco, Queen Products Division, King-Seeley Corporation, Albert Lea, Minnesota.

Use postpaid card. Circle No. 53

POLISHER CONTACTS WORK TWICE PER PASS



On a new Murray-Way sheet polishing machine, the single abrasive belt makes contact with the work twice in each pass. This arrangement provides twice the surface finishing ability of standard single-contact machines, according to the maker. (See inset on above photo.)

The machine, shown with hood removed, utilizes a 60" wide, single motor-driven abrasive belt which may be operated dry or with a mist spray or belt greasing to produce decorative finishes. Other belt widths may be specified. The dual contact rolls are oil resistant, statically and dynamically balanced, and rubber-covered to any desired density.

The endless conveyor belt is of vulcanized, 6 ply, high-friction, oil-resistant neoprene, running over extra large non-slip conveyor drums. Backlash is eliminated by a special gear coupling, and a compact, "in line" AGMA reducer permits selective drive speeds from 20 to 60 f.p.m.

Murray-Way Corporation, P. O. Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 54

INSTRUMENT MAGNIFIES, ILLUMINATES VERNIERS

A new magnifying instrument, the Magna Eye, has been designed for machinery equipped with a vernier scale. It is suitable for installations in which it is hard to read the scale, since it both illuminates and magnifies the figures.

The light is attached to the lens frame. A tubular shade is so locked to the assembly that no light penetrates the reader's eyes.

Stebar Company, 215-221 28th Ave. North, Minneapolis 11, Minn.

Use postpaid card. Circle No. 55

OPTICAL UNIT CHECKS OFFSET INTERNAL SURFACES

An optical inspection instrument called the Inspect-O-Scope is designed for internal checking of pipes, boiler tubes, and similar parts having an offset entrance hole. It is designed to locate flaws such as imperfect weld seams, flaws, and other obstructions inside of the parts.

The device can be inserted in an opening as small as a ½" pipe thread hole. Turning the scanning control knob rotates the objective window and light source through an arc of 360°.

A dial below the knob accurately identifies the position of the area under observation.

Calibrations on the side of the scope indicate the depth.

Size Control Company, 2500 West Washington Blvd., Chicago, Ill.

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new "HOW-TO-DO-IT" CATALOG ON DUST AND MIST COLLECTING Includes application suggestions, installation views, cut-away diagrams, dimensions . . . A wealth of practical guidance for DUST CONTROL which will improve working conditions and cut maintenance costs in your plant.

Hammond Machinery Builders INC.

1651 Douglas Ave. Kalamazoo, Mich.

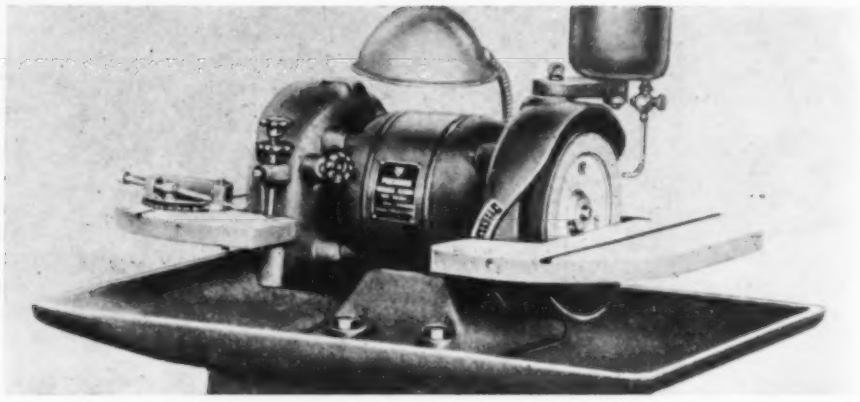
Use postpaid card. Circle No. 241

PRECISION PROTRACTOR NOW STANDARD EQUIPMENT

All wet models of Prosser tool grinders are now equipped with a special protractor as standard equipment at no extra cost.

The new protractor is divided in single degrees, reading to 90° in each direction from zero, and it is equipped with a sliding extension bar, to permit grinding of tools having acute angles. The protractor is rust proof, the graduated part being made of stainless steel, with rust proof guide.

The precision protractor can also be furnished as an extra with all of the other grinders in the Prosser complete line, which consists of wet and dry, floor and bench types, and precision grinders, for grinding all types of single-point tools of carbides, cast alloys, or high speed steel.



Thomas Prosser & Son, 28 River Edge Road, Tenafly, New Jersey.

Use postpaid card. Circle No. 57

SOLVED by LORCO® vibratory finishing

You can make substantial savings in time and cost of your precision finishing operations—as over 100 other firms have done—with LORCO vibratory finishing equipment.

LORCO vibratory machines will do any finishing operations now being performed in tumbling barrels, of course, in far less time and with invariably superior results. But most important, LORCO equipment can successfully finish parts that can not be done by any other mechanical means. All of the representative parts shown above were costly problems because of their size, shape, fragility, location of burrs, or finishing requirements. All are being finished successfully in Lorco vibratory equipment, with time and cost savings up to 90%.

Parts that are too fragile to tumble—parts having shielded, recessed, or inaccessible burrs—parts requiring the closest precision finishing tolerances can be LORCO Vibrator finished as readily as coarse work requiring severe cut-down.

There's a LORCO vibratory finishing machine for every requirement of production volume and size of parts. Six machine sizes, from ¼ cu. ft. to 16 cu. ft. capacity. Model 1930, illustrated, has 6 cu. ft. load capacity, many exclusive design and operating features.

Our vibratory finishing laboratory stands ready to prove the savings you can make on your toughest finishing problems, with Vibratory finishing. See your Lorco representative or write to Lord Chemical Corp., 2068-C So. Queen St., York, Pa.

LORD CHEMICAL CORP.
a majority-owned subsidiary of
WHEELABRATOR CORPORATION

Use postpaid card. Circle No. 242

CALIPER ATTACHMENT MAKES ULTRASONIC "MIKE"

Equipped with a newly-developed caliper attachment, a Sonoray® ultrasonic flaw detector may now be used to measure thickness of metals and plastics, from one side, to accuracies with ± 0.010".

Once the instrument is calibrated on a reference block of known thickness, shop personnel familiar with ultrasonic testing can learn to use the caliper efficiently in a few minutes.

The caliper attachment is available separately, for mounting on Sonoray detectors now in use, or it may be ordered installed on an instrument. It weighs approximately one pound.

Branson Instruments, Inc., 40 Brown House Road, Stamford, Connecticut.

Use postpaid card. Circle No. 58

WATER-SOLUBLE COOLANT CHECKS SURFACE BURNING

Surface burning, often a problem in plunge grinding, is eliminated with a new water-soluble grinding base, No. 609, according to the manufacturer. Its high lubricity prevents burning the ground surface.

The product makes a transparent emulsion at 50-1 dilution with water and does not form heavy deposits on the machine.

Where rust is not a problem, greater dilution is practicable.

Baker/Gubbins Company, 1448 Wabash Avenue, Detroit 16, Michigan.

Use postpaid card. Circle No. 59

DUST COLLECTOR MOUNTS DIRECTLY ON MACHINE

The Model DC-1 Max dust collector is mounted by means of adapters, brackets, or side plates directly on the dust-producing machine. It requires no ducts, can be moved with the machine.

The unit is readily adaptable for metalworking machines such as surface grinders, belt grinders, and polishing lathes. Its large impeller does not require high speed.

Model DC-1 comes complete with 1/3 hp motor, either 220/440 volt 3-phase or 115/230 volt 1-phase; side plate; and flameproofed bag.

Max Manufacturing Company, 138 Stockton Avenue, San Jose, Calif.

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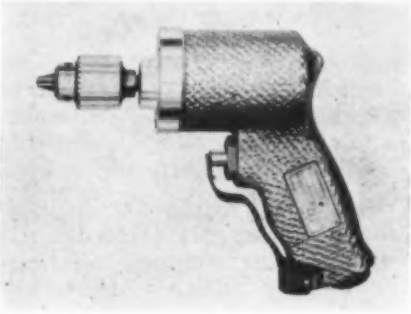
OPERATOR CONTROLS SPEED ON AIR SANDER-DRILL



Operator-controlled speed varying from 0 to 6000 rpm is an innovation on Superior Pneumatic's new dual-purpose sander-drill. The unit operates on 60 to 100 psi.

Operated as a sander, the Dual Purpose Model SP-1800 uses standard 4" discs or buffers for metal sanding, sheet metal buffing, deburring, and light weld scaling. Used as a drill, it takes any standard drill up to ¼".

Directed air exhaust blows away dust and chips as the operator works.

Unit weighs 3 lbs, measures 7½" overall.

Superior Pneumatic & Mfg., Inc., 13800 Enterprise Avenue, Cleveland 35, Ohio.

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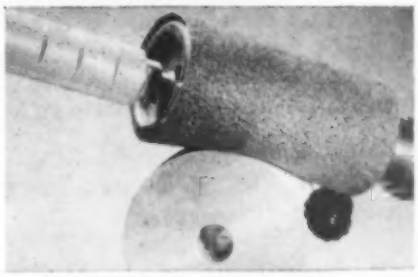
PORTABLE SANDING TOOL IS AIR "ROLLING PIN"



For portable coated abrasive operations there is now an air-inflated "rolling pin" sanding tool.

Reported as the first of its kind, this Model 360 roll is 3" in diameter

continued

Difficult hole location problems solved for short runs

At the Westinghouse Ordnance Plant, Lansdowne, Maryland, a Sheffield Coordinate Measuring Machine determines the true location of 18 holes in a magnesium integrator or gear box. Fifteen holes are checked to ±.00017; two holes to ±.00023; and 1 to ±.000075 (75 millionths).

Previous inspection with a height gage took two days and did not determine out-of-round condition. Sheffield reduced the time to six hours, checked for roundness, provided overall accuracy within .000075 on three axes.

Write for Catalog P-193 or call your Sheffield representative.

The SHEFFIELD Corporation Dayton 1, Ohio

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and 6" long. It is planned for high-production sanding on either flat or contoured surfaces.

The roll can be used with nearly any horizontal grinder having a ⅝ x 11 threaded spindle and a speed of 4500 rpm or less. For final finishing, a spindle speed of 3000-4000 rpm is recommended.

Model 360 can be used on standard bench-mounted motors and is readily adaptable to special sanding and deburring machinery.

Nu-Matic Grinders, Inc., 875 East 140th Street, Cleveland 10, Ohio.

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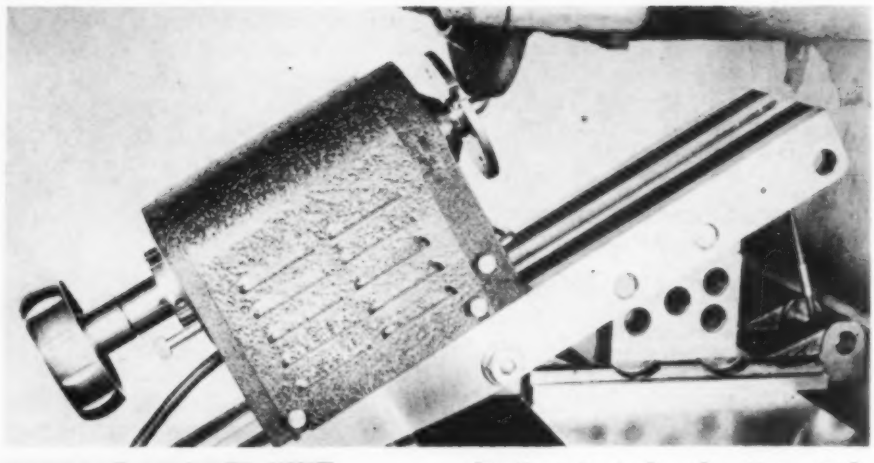

SURFACE GRINDER UNIT CONVERTS FOR CYLINDRICAL

A cylindrical grinding and indexing attachment makes possible a variety of grinding operations on any surface grinder. Suggested applications in tool and cutter grinding include disc cutters, points on lathe centers, mill saws, and similar parts.

Straight or tapered jobs can be handled by placing this attachment on a magnetic chuck and mounting the work between centers or in spring collets or chuck.

For grinding tapers, the attachment has a two-way 5" sine bar tilt adjustment with which angles can be duplicated.

Attachment has three speeds: 200, 400 and 700 rpm. Capacity between centers is 7½" length and 6½" diameter. Collet capacity is ⅝" with ½" hole through spindles.

Therien Engineering and Machine Company, 4908 North Odell Avenue, Chicago 31, Illinois.

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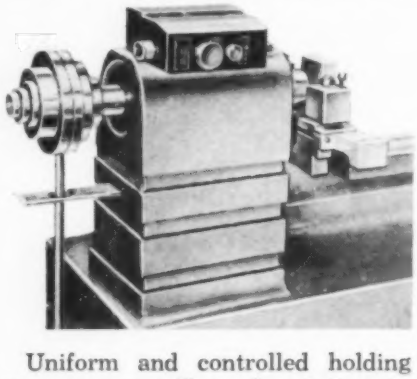
COLLET ACTUATOR CLAIMS UNIFORM HOLDING PRESSURE



Uniform and controlled holding pressure, regardless of variations in chucking diameter, is one of salient features claimed for PowerGrip's Model 26A collet actuator.

The basic principle of the actuator is a stationary air or hydraulic cylinder, joined through ball bearings to the rotating machine spindle and draw tube. In effect the draw tube is converted into a shaft, giving additional support to the actuator housing.

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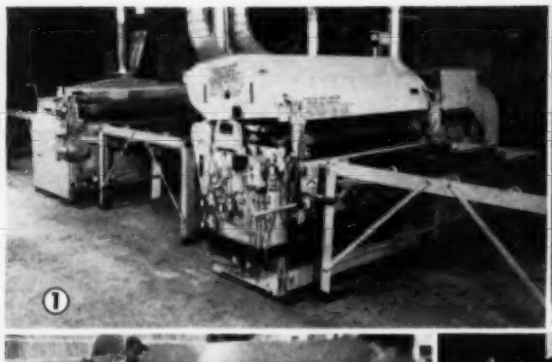

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   . . . for finishing 28'x24" aluminum curtain wall panels
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   . . . for deburring and polishing metal grilles

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Model 26A is designed for use on grinders, lathes, hand screw machines, and gear cutters, to actuate any holding device which requires a pull-back action to operate it.

The cylinder is supplied with adapter and draw tube to fit machine. Standard draw tube is 1⅜" OD, 1-1/16" ID. Draw tube pull is 1,200 lbs., maximum spindle speed 4,000, stroke 3/16".

PowerGrip, Inc., Main Street, Rockfall, Connecticut.

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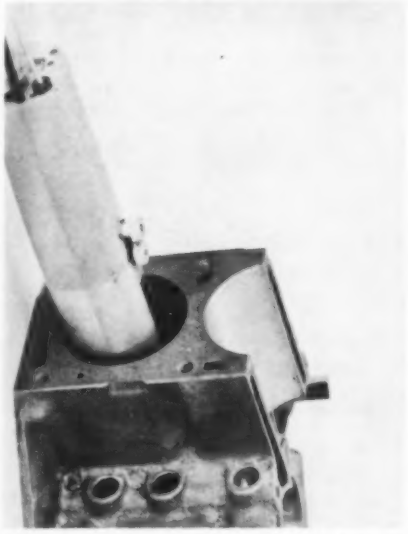
SURFACE FINISH ACCESSORY CHECKS INTERNAL PROFILES



The Proficorder internal linear Pilotor is an instrument for checking surface irregularities in holes of varying shapes and sizes. Designed as an accessory to Micrometrical's Proficorder, it provides for non-destructive surface measurement of parts that formerly had to be cut apart for such testing.

A 4" wide strip chart with the Proficorder permits easy reading and identification of all surface irregularities. Vertical readings can be magnified many thousands of times and horizontal readings many hundreds of times, permitting the detecting of even the minutest surface variations.

The amount of magnification desired is dependent upon the character of the surface being profiled and upon the type of irregularities which one is interested in studying. By using appropriate magnifications, the size, shape, and relative position of these surface irregularities can be studied in their relationship to other irregularities.

This latest Pilotor is interchangeable with the linear and Rotary Pilotors.

Micrometrical Mfg. Co., 3621 South State Road, Ann Arbor, Michigan.

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LAB VIBRATOR DESIGNED FOR SMALL-PART FINISHING

A laboratory model vibratory finishing machine has been designed for laboratory use and for quantity production of small precision parts.

The Vibrodyne Model V-013 is reported as particularly adapted for deburring, descaling, cleaning, and polishing of powdered metal gears, steel bushings, and aluminum and copper parts for the electronic industry; ceramic discs, eyelets and wedges; and like parts.

The unit is portable; 18" long, 11" wide, and 11.5" high. Tub capacity is approximately one gallon.

The Stevenson Company, Wellsville, Ohio. (Reply to 1784 Stanley Ave., Dayton 4, Ohio.) • • •

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Are you buying free rides for a lazy coolant?

Does your coolant or oil breeze through a grinding machine without contributing to faster cutting, better finish, longer wheel life?

Is it responsible for poor accuracy, poor chip-settling and rust? Does it foam? Is it tough on the hands?

If so, switch to White & Bagley *lively* coolants. There's not a lazy drop in a tankful!

For a 1¢-a-gallon all-purpose coolant, get W&B Chemical Concentrates: W&B 1500 for steel (and titanium) W&B E-55 for steel, cast iron, nonferrous metals. You get extremely keen grinding action.

For grinding AND cutting, get W&B Lubricant 1888 — A high detergent, water soluble for better finishes.

For very tough grinding and cutting jobs, get W&B HD Soluble 2213. Gives exceptional support and cooling.

For critical thread, gear, tap and form grinding, get W&B Grinding Oil 1572. It's a standard of the industry.

For facts about *lively, hard-working* coolants, write . . .
The White & Bagley Co., 88 Foster St., Worcester, Mass.

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This most comprehensive, most usable directory for the metalworking industry is an attractive, hard covered, thumb-indexed, desk-sized book containing more than 1000 pages made up of the following sections:

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- **TOOL STEELS** Producers, distributors, trade names and AISI designations of tool and die steels.
- **CARBIDES** Suppliers, grades and uses of carbides.
- **CUTTING FLUIDS** Suppliers, grades and suggestion applications of cutting fluids and coolants.
- **GRINDING WHEELS** How to use grinding wheels, the markings on wheels and other important data is included in a handbook section.
- **INDEX TO ADVERTISERS** Includes a complete list of all principal products supplied by each 1961 advertiser.
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Use this handy order form to put this directory to work for you. There is no substitute for accurate information and practical suggestions on specifying equipment. Directories will be mailed February 1, 1961.

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C. F. Leitten

J. H. Simonds

Newly-elected officers of the Grinding Wheel Institute for 1961 are: L. A. Patt, chairman of the board; W. G. Pinkstone, president; and C. F. Leitten, vice president. John H. Simonds, president of Simonds Abrasive Company, Philadelphia, Pennsylvania, was elected chairman of the Board of Directors of the Abrasive Grain Association.

Patt is vice president and general manager, Bonded Abrasives Division, The Carborundum Company, Niagara Falls, New York. Pinkstone is vice president, A. P. de Sanno & Son, Phoenixville, Pennsylvania; and Leitten is president of Electro Refractories & Abrasives Corp., Buffalo, New York.

New members of the Institute's Board of Directors are: R. C. Franklin, president, Macklin Company, Jackson, Michigan; C. R. Anderson, assistant sales manager, Robertson Manufacturing Co., Trenton, New Jersey; M. W. Gormly, manager, Products Division, Cincinnati Milling Machine Co., Cincinnati, Ohio; and H. G. Jones, vice president and director of research and development, Mid-West Abrasive Co., Owosso, Michigan.

New members of the Board of Directors are (l to r) C. R. Anderson, R. C. Franklin, M. W. Gormly. The fourth newcomer, H. G. Jones, was absent.

OPEN WORLD'S LARGEST BARREL FINISHING PLANT

Recently Micro Deburring Company conducted an open house for their new $500,000 plant at 1830 East Lunt Ave., in Centex Industrial Park, Elk Grove Village, Ill. The single-story structure occupies 25,000 square feet and houses the world's largest custom barrel finishing plant.

The building includes offices, display and conference room, laboratory and operation area. In the operations area are 40 finishing machines. These machines are: 2 vibrational barrels, 3 tube type machines, and 35 conventional barrel finishing machines. Also within this area are 5 magnetic separators, 1 batch dryer, 1 batch finishing machine, and 5 open-end drying machines.

Equipment in the laboratory includes 8 additional finishing barrels. As midwest distributor for Minnesota Mining and Manufacturing Co., Rampe Manufacturing Co., Sterns Magnetic and others, Micro Deburring has still 5 more machines on display in their display room.

The most interesting equipment being used by Micro Deburring was a new straight-through, media-retaining tumbling barrel and a new line of vibratory equipment.

continued

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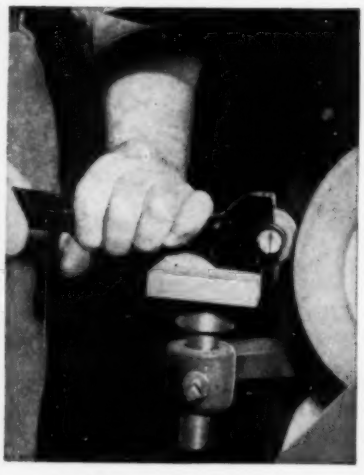

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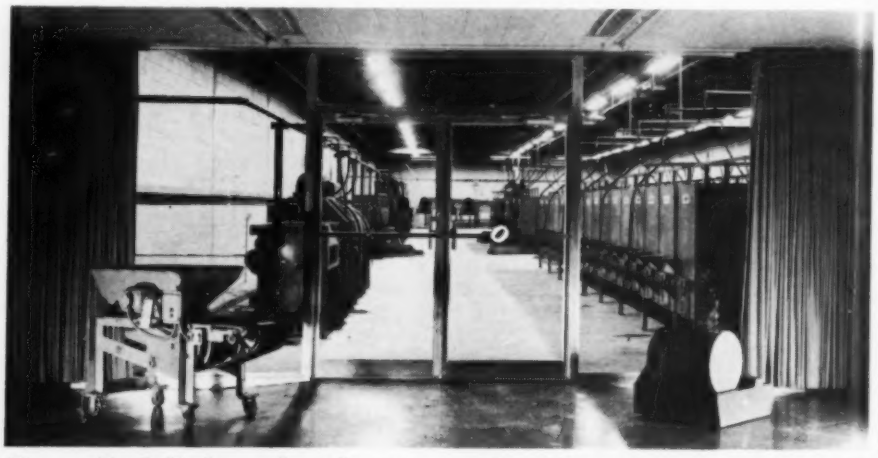
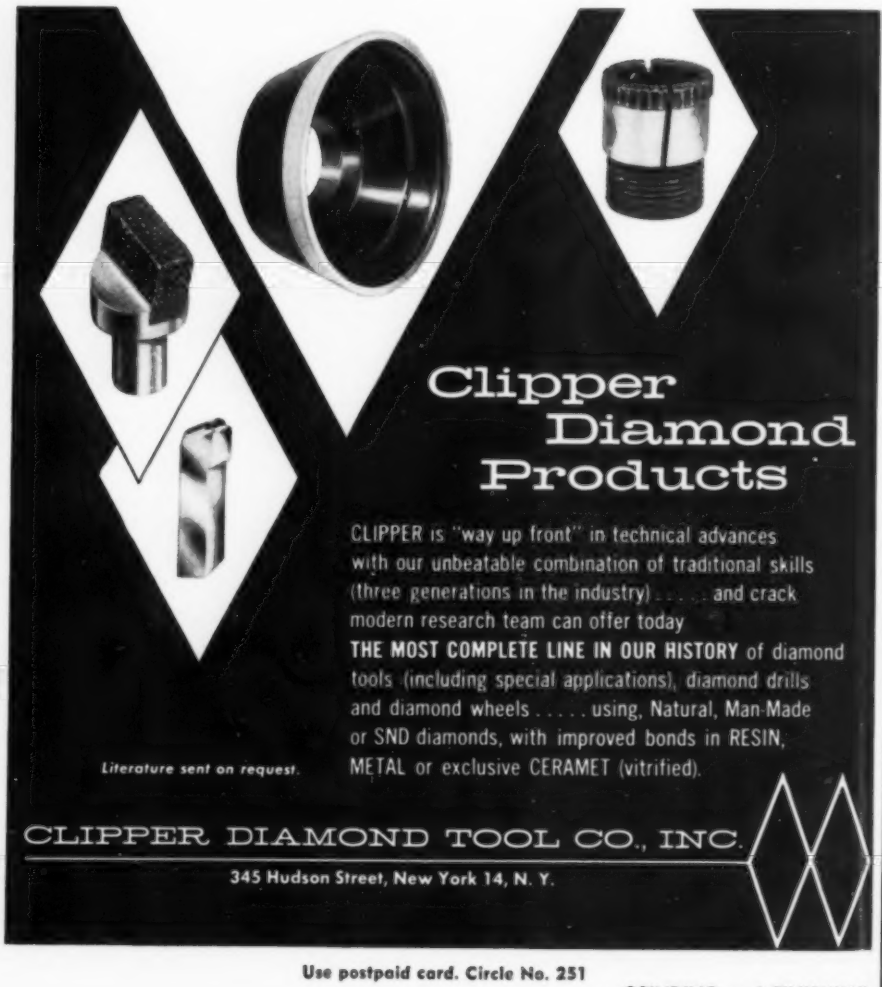
NEWS OF INDUSTRY *continued*

The straight-through machine is designed and built for 3M Co. by DLM Equipment Co., Cincinnati, Ohio. In these machines, the parts are fed into the drum at one end, and after completion of the finishing cycle, are automatically discharged from the other end. As the parts and media are discharged from the tumbling compartment they are thoroughly rinsed as they are separated from each other. The parts being carried out of the machine by a magnetic conveyor are carried over a demagnetizer. The media, thoroughly rinsed, remains in the barrel ready for the next load of parts.



Glass wall of display and conference room in Micro Deburring's new plant affords view of production lines in action. Customers can see equipment and machinery in use when draw drapes uncover 25' wide expanse.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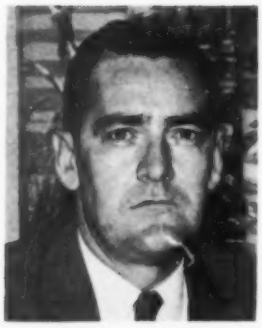
Changing Faces . . .

E. M. Koeritz



Jack T. LeBeau

T. R. Klecak

Dr. Erwin M. Koeritz has been promoted to manager of manufacturing, Metallurgical Products Department, General Electric Company, Detroit.

He had been manager of manufacturing engineering in the firm's Silicone Products Department, Waterford, New York, since 1956, and joined GE in 1952.

George W. Herman has been promoted to manager of the Allison abrasive wheel plant, Allison-Campbell Division, American Chain & Cable Company, Inc., Bridgeport, Conn.

Jack T. LeBeau has been elected vice president, Abrasives Division, Besly-Welles Corporation, Chicago and South Beloit, Illinois. He succeeds Norman C. Minehart, who retired after 38 years with the firm.

Leroy D. Weiss has been promoted from West Coast sales manager to assistant general sales manager for the A. I. T. Diamond Tool Company of Skokie, Illinois.

John W. Decker has been named manager, Shear-Speed Chemical Products Division, Michigan Tool Company, Detroit, Michigan.

The Elgin National Watch Company, Abrasives Division, Elgin, Illinois, has announced the appointment of Leo Marino, Brockton, Mass., as direct field engineer for the diamond products of the division.

Thomas R. Klecak has been appointed West Coast regional manager, industrial distribution, for Pratt & Whitney Co., Inc., of West Hartford, Connecticut.

This is one of the steps in P&W's recently announced plan to switch from direct sales to selected industrial distributor sales.

Thomas G. Utley, vice president of MetroLonics, Inc., Burbank, California, has been appointed to the additional post of general manager, and Joseph S. Meyer is the company's new vice president, marketing.

Prominent manufacturer of all industrial diamond products wishes to expand its sales representation. Several choice territories now open in northwest, southwest, midwest and southeastern states. Attractive discounts and commissions offered to experienced individuals.

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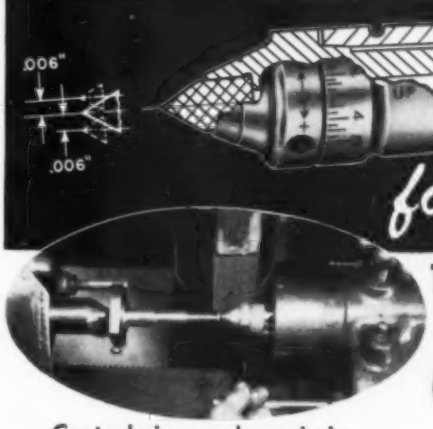
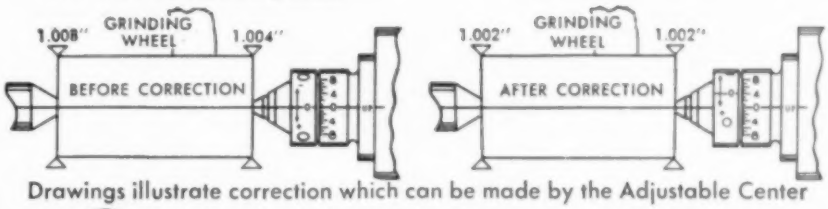
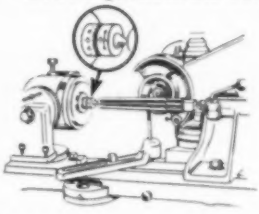


Center being used on grinder

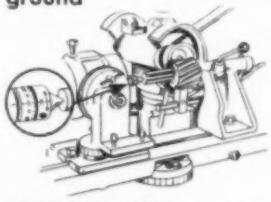
The Enco Micro-Set® Adjustable Center



Drawings illustrate correction which can be made by the Adjustable Center



Taper reamer being ground



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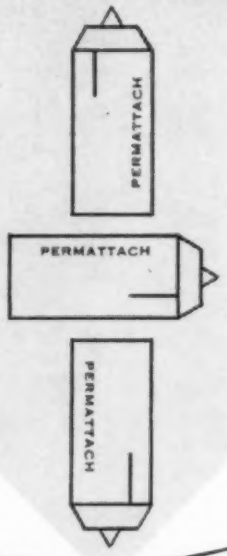

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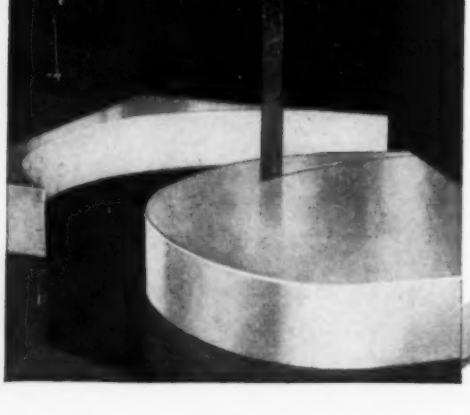

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WILKIE FOUNDATION GIVES DoALL MACHINE TO SCHOOL

Students at Dunwoody Institute, a Minneapolis trade school, are receiving practical experience in maximum productivity through the generosity of the Wilkie Foundation, organized by three brothers who head up the DoAll Company, Des Plaines, Illinois.

The Foundation recently gave the school a new Contour-Matic band machine, its sixth DoAll machine to be so presented.

Organizers of the Foundation are Leighton A. Wilkie, board chairman, and Robert J. Wilkie, president, of DoAll, and James W. Wilkie, president of Continental Machines, Inc., Savage, Minnesota, where DoAll machine tools are manufactured.

RAYTHEON EXPLORES "ULTRASONIC CAN OPENER"

Feasibility of ultrasonic impact grinders to aid demolition squads in disarming unexploded bombs is being studied by engineers of Raytheon's Commercial Apparatus and Systems Division, Norwood, Mass.

The study aims at developing a technique for cutting into steel-encased bombs without generating excessive heat.

Ultrasonic impact grinders are now widely used in industry to cut hard and brittle materials. A tool tip moves up and down 25,000 times a second driving an abrasive liquid against the work to be cut. Although the tool itself never touches the work, the tiny particles in the liquid cut the work in the same shape as the tool to an accuracy of 0.0002 inches.

BEGIN MAKING VIBRATORY FINISHERS IN TORONTO

The Vibro-Equipment Division of SWECO Canada, Ltd., a newly-formed Canadian company engaged in the manufacture of vibro-equipment for process industries, has started operations at its main plant and offices at 21 Jutland Road, Etobicoke, Toronto, according to Robert P. Miller, president.

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DALTON BECOMES VP OF AMERICAN GRADED SAND

Arthur T. Dalton, formerly with Chicago Wheel & Mfg. Co., has joined American Graded Sand Company, Chicago, Illinois, as vice president in charge of grinding wheels sales. The announcement was made by Herbert Wenske, president of the company.

Dalton has been active in the grinding wheel industry for many years. His recent term as chairman of the Board of Directors of the Grinding Wheel Institute was the climax of his activities with the group. He had previously served as chairman of the committee on public relations and on a number of other groups.

Dalton is a member of the Business and Defense Services Administration unit of the National Defense Executive Reserve. He also served on the advisory committee of the abrasive industry during World War II and the Korean War.

A. T. Dalton

R. O. Lane

LANE NAMED TO KERAMOS

R. O. Lane, vice-president in charge of research and development at the Macklin Company has been named an honorary member of KERAMOS, the national professional fraternity of ceramic engineers, scientists, and technologists.

The honor was conferred at a dinner given at Ohio State University, Columbus, Ohio on November 17. Lane addressed the group at the dinner.

Election to KERAMOS is strictly honorary, and is based on the quality and accomplishments of the individuals selected for honorary membership.

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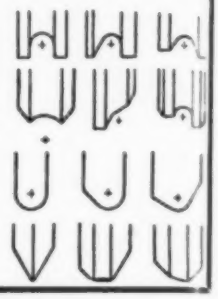

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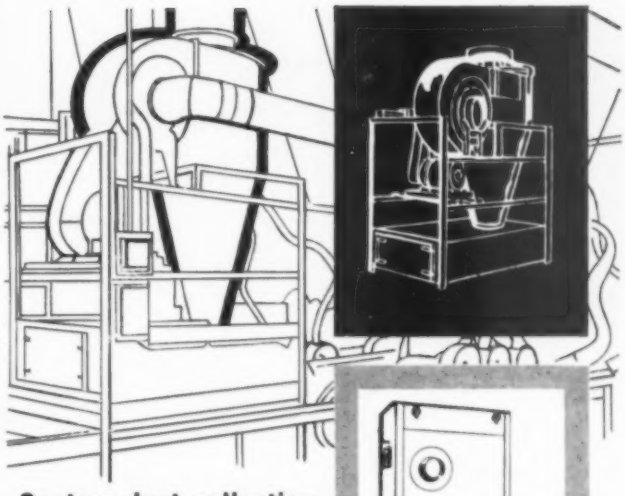

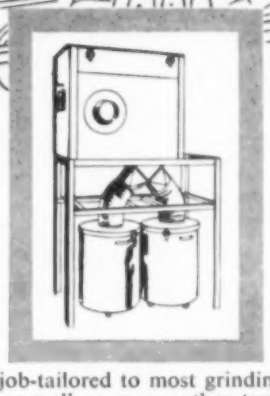

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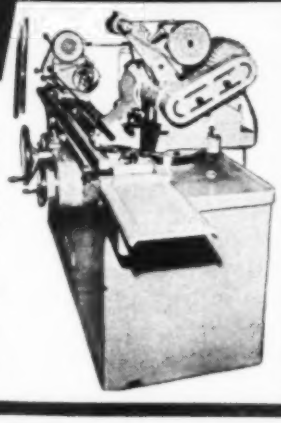

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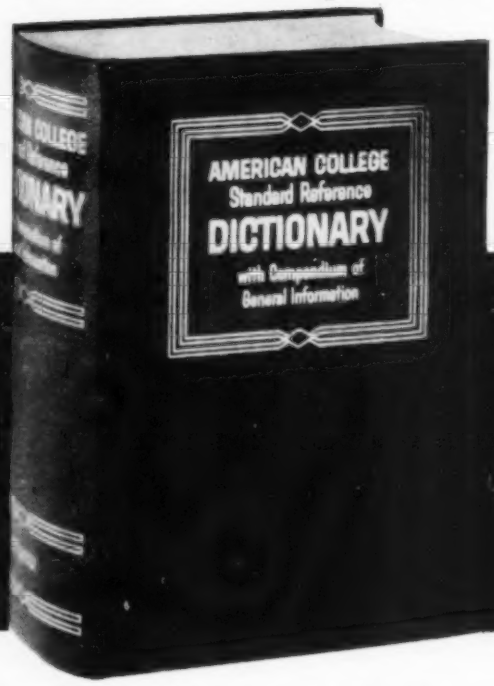

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Just Another Year?

With nothing remaining of the holidays except bills and pieces of tinsel under the rugs, and a nostalgic, and maybe a nagging, guilty feeling, over what's happened to the good cheer and the bright promise of the holiday season, we now address ourselves to the new year. It will appear to be a year like all other years, fraught with sickness, joy, sorrow, pain, frustrations and all the other ills and blessings with which mankind trundles its way through life, for better or for worse. Good business, poor, spotty, uncertain business, new products, minor successes, failures, and the usual horse opera intellectualism of TV. Yes, seemingly, just another year. Really?

As we sit quietly in our office, or when we drive to work, or simply relax in the big red easy chair by the fireside, isn't there a thin, small voice mumbling at us that all is not beer and skittles? Doesn't there flash through the mind a sickening feeling of walking on ice across a river? Solid ice, to be sure, but don't we wonder, how thick and how safe?

We say this year will be like other years, with one exception: clouds, at one time no bigger than a man's hand, will this year, with black, jagged edges, cover a larger part of the heavens. Imports are starting to rob us blind (a larceny many manufacturers encourage), exports are going the way of all flesh, our dollar is spotted with slight fissures and a creeping cancer, communism is gaining in strength. This is the year these clouds will expand. They could darken this land in a few years.

And we answer these clouds with complacency; they will dissipate, assuming blithely that, like a common cold, if we take a rest eventually it will go away. So we let our equipment rust in aged facilities and proceed on the cheery note that 1961 will be just another year. And this is our big mistake.

The first thing we must do is to become aware of the problems. Really aware of them! Thoroughly and completely recognize that they exist and that they will not resolve themselves. We must understand that the government will not solve them. Only industry can solve the problems. Only industry can lick competition, only industry makes jobs, only industry can maintain our standard of living. No one else can do this. This means you and me.

Let us awaken to the problems. Let the managers, engineers, production and sales executives with their technical acumen, with their ready minds and their old fashioned Yankee energy, face up to the situation and begin to think. We must shake off this lethargy and growl, "Enough is enough. Get off our backs. You've had it."

At the precise moment that we face the problems, sit down and think and plan, and decide to do something about them . . . at that precise moment the importers, the communists and the pack of price cutters will be on the run. If we do this, 1961 will not be just another year.

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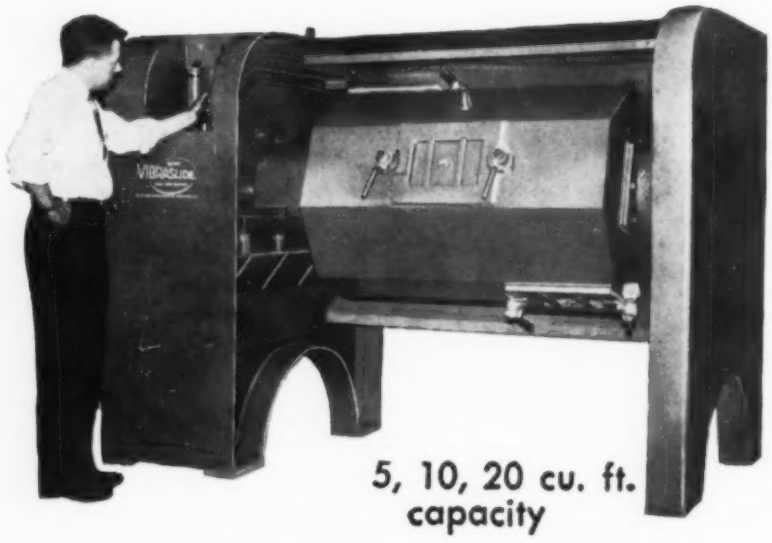

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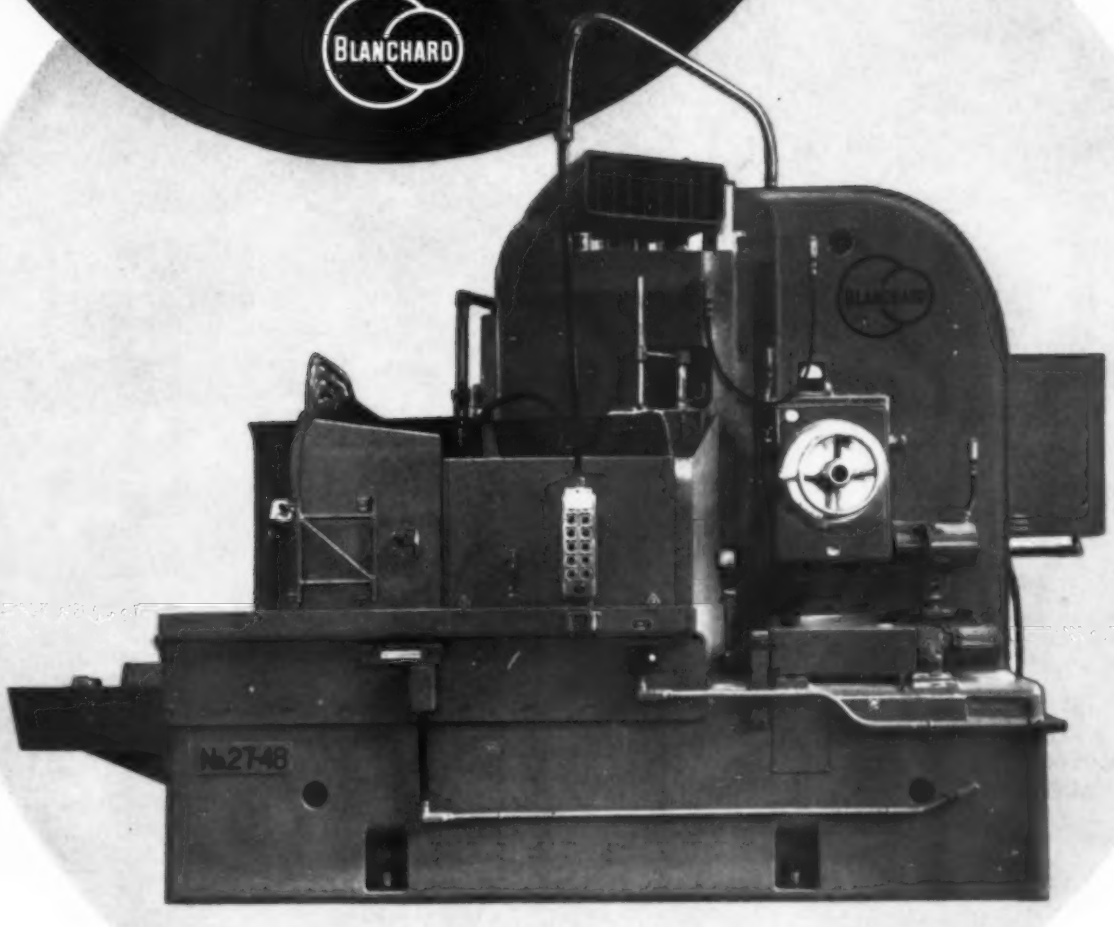

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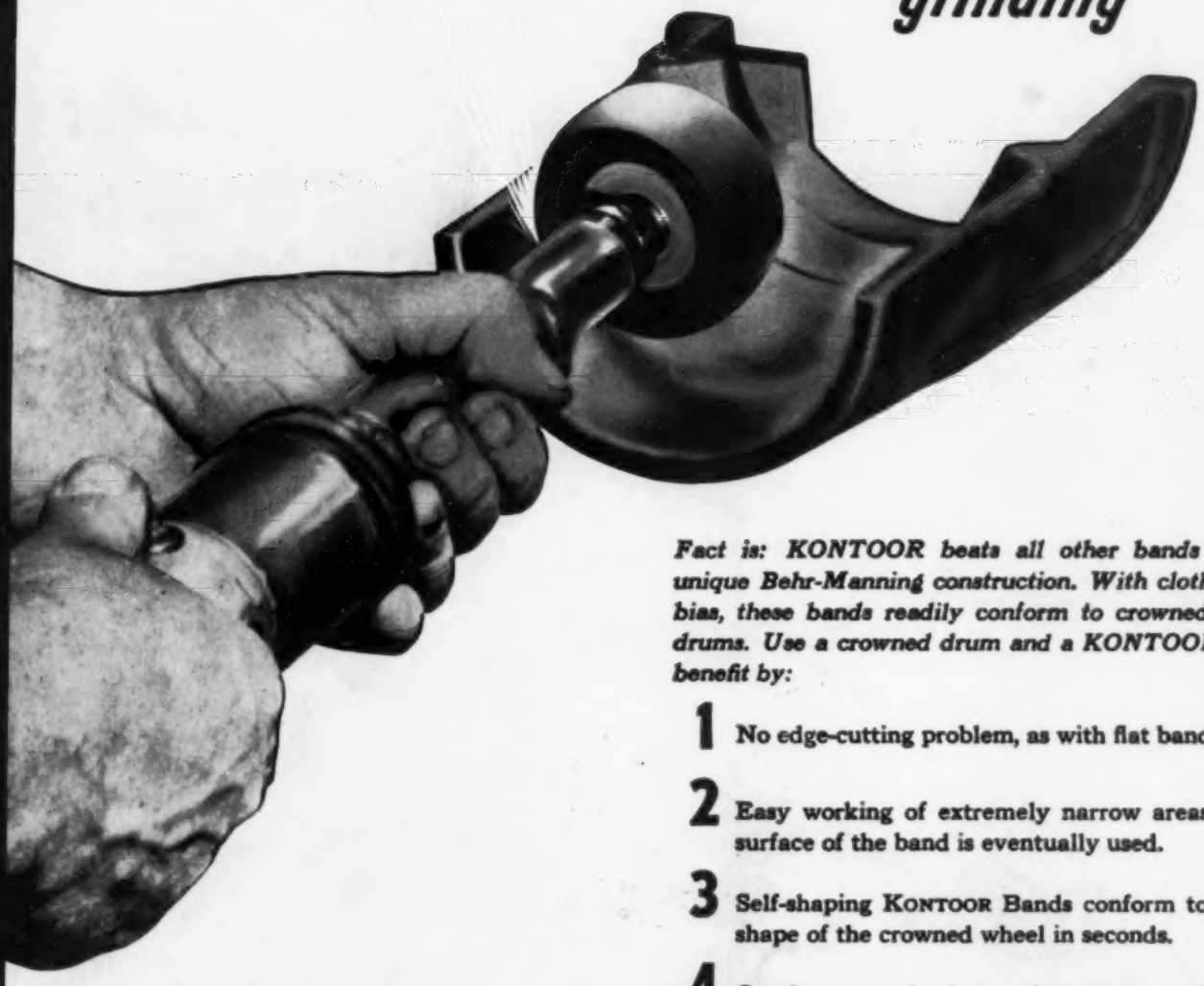

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